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AVIATION NOTES

GREAT BRITAIN

SYSTEM OF TRAINING AT CALSHOT ROYAL AIR FORCE STATION

The Royal Air Force system of training differs from the United States Navy's system in that the initial primary instruction is carried on in land planes; after officers have qualified as aviators they are sent to Calshot for seaplane instruction, which begins with flight training in Faireys and is completed in Southamptons. Great attention is paid to work in navigation in the big boats and the staff at Calshot prides itself on the excellence of its navigation courses. The station is equipped with a limited number of Fairey single engine twin float training seaplanes and Southampton twin engine flying boats. In addition to the training activities, a service flight of six Southampton flying boats is maintained at Calshot. Approximately 50 Royal Air Force officers were undergoing training this spring (1930), all of whom had completed their flight training in land planes. The Southampton flying boat with metal hull, has stainless steel for the bottom of the hull, the rest of the hull being duralumin; bottom plates, are riveted, with no evidence of welding.

BRITISH PRIMARY TRAINING PLANES (GYPSY MOTH AND TOMTIT)

At the present time there are two planes in production in England which are being seriously considered by the Air Ministry for adoption as primary training planes. One is well known in the United States, the Gypsy Moth, it being under license for construction in America; the other, the Hawker Engineering Co. Tomtit training plane. The Gypsy Moth represents what might be termed a commercial development which is now considered suitable for military primary training; on the other hand, the Tomtit was designed and built solely for the purpose of supplying the air force with a suitable primary training plane and is therefore more expensively and carefully constructed than a corresponding commercial or sports type plane need be. The details of the Tomtit training machine are as follows:

This machine is a two-seater fitted with Mongoose engine, and designed to conform with all the latest requirements of training machines. A special feature is that of a hood which can be pulled

over the pilot by the instructor in order that he may receive instruction in blind flying, i. e., under conditions prevailing when flying through cloud or fog. When the hood is in operation the instrument board is lighted by a flood system, and a Reid patent turn indicator has been fitted in order that the pupil may ascertain whether he is flying straight and on an even keel. It is the first time such instruction has been given in England, and in future it will form a regular part of the Royal Air Force curriculum.

Brief particulars, dimensions, and performance

Fuel capacity and range, 24 gallons, approximately 350 miles.

Dimensions:	
Span	28 feet 6 inches.
Length	23 feet 5 inches.
Height	8 feet 8 inches.
Chord	4 feet 9 inches.
Surface	238 square feet.
Weight, empty	1,100 pounds.
Weight, loaded	1,750 pounds.
Performance with Mongoose engine:	
Climb to 1,000 feet	59 seconds.
Climb to 3,000 feet	3 minutes 19 seconds.
Climb to 5,000 feet	6 minutes 7 seconds.
Climb to 10,000 feet	14 minutes 22 seconds.
Speed at 1,000 feet	124 miles per hour.
Speed at 3,000 feet	122 miles per hour.
Speed at 5,000 feet	119 miles per hour.
Speed at 10,000 feet	102 miles per hour.

The reasons assigned for providing the Armstrong Siddeley Mongoose engine or the A. D. C. Hermes in the Tomtit are purely financial, the Mongoose being a much more costly engine than the Hermes. From a knowledge of the Gypsy Moth and a fairly complete inspection of the Tomtit, the opinion prevails that the Tomtit, from a structural point of view, is a better plane than the Gypsy Moth, though it may be that the Gypsy Moth will be adopted by the Air Ministry as the service primary training plane purely on the basis of cost. Up to the present time the Gypsy Moth has been produced in large numbers for sport and commercial flying with the result that the cost of production is very much less than the Tomtit, which, up to the present time, has been built solely as a primary training plane for military aviation.

It should be understood that the British system of training on primary training planes does not require a plane being equipped with guns, radio, or bomb sights, the idea being that students should be given primary training instruction, in its simplest form, in a relatively small, light, low horsepowered plane, and that all advanced flight instruction should be carried out in service types of planes.

THE HAWKER HART HIGH-PERFORMANCE DAY BOMBER

The Hawker Hart is designed to meet the need for a high-performance day bomber, suitable at the same time for use as a reconnaissance or two-seater fighter machine. The construction is of metal throughout, and as the result of extensive competitive trials the Air Ministry have adopted this machine for the reequipment of the Royal Air Force squadrons. The structure is of metal with fabric covering and embodies the Hawker patent system of metal construction, which is universally regarded as most efficient in every respect.

Fuselage.—The fuselage is constructed of steel and duralumin tubing. The longerons are of round steel tubing and the struts of round duralumin tubing flattened at the point of contact and interconnected by flat plates and tubular rivets. The cross strut is of ball ended duralumin tubing fitting into a cupped bolt which passes through the connecting plates, thus insuring perfect alignment. The engine mounting is of tubular steel constructed on the same principle as that embodied in the fuselage and forms a very rigid unit. It is attached to the longeron by four bolts, and removal is an easy process. The streamlining of the front portion is neatly and effectively carried out and sufficient room is provided at the back of the engine for accessibility. The cockpits are well sheltered, and controls and instruments are within easy reach and view. The seats are designed to take standard parachutes, and the pilot's seat is adjustable in the air. The observer's seat falls back to give free access to the prone bombing position, the bombing hatch in the bottom of the fuselage being provided with a sliding shutter. Provision is made for the oxygen apparatus and camera at the rear of the observer's cockpit, and the wireless crate is attached to the port side, a movable panel giving free access from the outside. One Vicker's gun is fitted on the port side of the pilot's cockpit, and a Lewis gun is mounted on the Hawker type gun ring. The radiator is of honeycomb tubular construction and is easily retractable from the pilot's seat.

Main planes and ailerons.—The main planes are of the single-bay type with top center section only. The top section is supported from the fuselage by four outwardly inclined steel streamline struts well out of the line of the pilot's forward view. The interplane struts are arranged in N form and are of tubular steel of streamline section. The construction of the main planes is metal; the spars are of drawn steel strip, and in section they form an upper and lower tube with a connecting web between. The ribs are of duralumin. The wing sections are R. A. F. 28. Ailerons are fitted to the top plane only and are of the differential type and balanced; in construction they are similar to the planes.

Landing chassis.—The landing chassis is of the orthodox straight axle type, having two oleo legs and two rear radius struts with swaged wire bracing. The oleo legs and are of the air and oil (Vicker's) type.

Tail unit.—The tail plane, elevators, rudder, and fin, are of metal construction. Continuous spars are fitted to the tail plane and and elevators; the tail plane spars are of steel and of similar construction to the main planes. A tubular spar is fitted to the elevators, the ribs of both being of duralumin. The tail plane is adjustable, a screw and sprocket gear acting directly on the rear spar. Operation is by means of a hand wheel and graduations are shown on a scale. The tailskid is of simple construction consisting of a steel tubular arm pivoted on a special fitting, the shock being taken by rubber pads in compression.

Controls.—The controls are of simple design, the cable leads being very direct and arranged to give a minimum amount of friction. Fore and aft adjustable stirrups are fitted to the pilot's rudder bar. An auxiliary connection for the observer's use is fitted at the side of the bombing hatch.

Tanks.—The two fuel tanks are situated in the center section and fuselage; one is gravity feed with a capacity of 20 gallons, and the other pressure feed, by both engine and hand pumps with a capacity of 67 gallons. The oil tank with a capacity of 7 gallons is situated immediately under the main fuselage tank. All tanks can be made of either welded aluminum or tinned steel.

Bombs.—Provision is made for carrying either two 230-pound, and four 20-pound bombs, or alternatively three 112-pound, and four 20-pound bombs.

Instruments.—Provision is made for the fitting of all standard instruments and compass.

Dimensions and performance of Hawker Hart high performance day bomber

Span	37 feet 6 inches.
Length	29 feet.
Height	10 feet 9 inches.
Area	350 square feet.
Total weight	4, 320 pounds.
Load	1,824 pounds.
Speed at 5,000 feet	177. 5 miles per hour.
Speed at 10,000 feet	172 miles per hour.
Speed at 15,000 feet	163 miles per hour.
Speed at 20,000 feet	139 miles per hour.
Climb to 5,000 feet	3. 54 minutes.
Climb to 10,000 feet	8. 36 minutes.
Climb to 15,000 feet	15.54 minutes.

Climb to 20,000 feet	32.4 minutes.
Service ceiling	20,700 feet.
Landing speed	62 miles per hour.
Endurance	4½ hours.
Range	600 miles.

PERFORMANCE OF BRITISH SINGLE-SEAT FIGHTERS AND INTERCEPTOR FIGHTERS

The following data are available respecting British single-seat fighters and interceptor fighters. Although these data are incomplete, the following should be borne in mind relative thereto:

(a) As to types of planes regularly used in the British service, the Vickers-Armstrong Siskin fitted with Armstrong Siddeley Jaguar engine and the Bristol Bulldog are very extensively used; therefore, a comparison of their performance with corresponding types used in the United States affords a very definite measure of the merits of current service type fighters used in both countries.

(b) The Vickers Vereo, the Hawker Hornet and the Fairey Firefly II interceptor fighters are experimental in design. Regardless of how advanced the British experimental program in single-seat fighters may be at this time, it appears that it will be some time before the experimental program will be translated into equipment for service squadrons, in the form of more advanced types than those at present in general use. It may be said, however, that the appearance of the Vickers Vereo and the Hawker Hornet do not impress one that the characteristics of these planes, so far as speed, maneuverability, and climb are concerned, are in any particular respect remarkable, or markedly superior to our own types.

Siskin with Armstrong-Siddeley engine

Engine	Weight, full load (pounds)	Maximum speed (miles per hour)	Climb (feet)	Ceiling (feet)
Jaguar direct drive	3,010	156 at ground	10,000 in 8.25 minutes	21,300
Jaguar supercharged	3,040	160 at 10,000 feet	10,000 in 7 minutes	27,100
		166.5 at 15,000 feet		
		154 at 20,000 feet		
Jaguar geared	3,120	162.5 at ground	10,000 in 7 minutes	22,800
		158 at 10,000 feet		
		152 at 15,000 feet		
Jaguar geared and supercharged.	3,150	175 at 15,000 feet	15,000 in 9.75 minutes	30,700
		174 at 20,000 feet		
		166.5 at 25,000 feet		
Jaguar direct	3,060	161 at ground	10,000 in 7.75 minutes	23,300
		163 at 10,000 feet	15,000 in 13.75 minutes	
		157 at 15,000 feet		
Jaguar Major supercharged	3,070	179 at 15,000 feet	15,000 in 10.75 minutes	29,100
		169 at 20,000 feet	20,000 in 16 minutes	
Jaguar Major geared	3,170	172 at 5,000 feet	10,000 in 6.5 minutes	24,800
		169.2 at 10,000 feet	15,000 in 11.5 minutes	
		164 at 15,000 feet		
Jaguar Major geared and supercharged.	3,180	186.5 at 15,000 feet	10,000 in 6.5 minutes	32,700
		185.5 at 20,000 feet	15,000 in 9.25 minutes	
		180.5 at 25,000 feet	20,000 in 12.75 minutes	
			25,000 in 17.75 minutes	

British single-seat fighters

Name	Type	Engine	Weight, full load (pounds)	Performances (miles per hour)	Climb (feet)	Ceiling (feet)	Range (hours)
Nimbus Martinsyde.	A. D. C	330 Nimbus, water.	2, 665	150 (f), 131 (c)	10,000 in 7.30 minutes.	23, 500	2½
Martinsyde	A. D. C. 1	385/425 Armstrong-Siddeley, air cooled.	2, 650	163 (f)	10,000 in 5.30 minutes.	27,000	3
Bristol Bulldog.	S. S. F	450 Bristol Jupiter VII, air cooled.	3, 250	174 at 10,000 feet, 167 at 20,000 feet.	20,000 in 14.5 minutes, 26,500 in 27.2 minutes.	27, 000	----
Fairey Firefly II.	do	Curtis D-12	2, 900	185 at 10,000 feet.			
Vickers Vereo	S. S. F. low wing monoplane.	500 horsepower Bristol Mercury IIA, air cooled.	(1)	(1)	(1)	(1)	(1)
Hawker Hornet.	S. S. interceptor fighter, biplane.	Rolls Royce FX15, water cooled.	(1)	(1)	(1)	(1)	(1)
Fairey Firefly II.	do	Rolls Royce F, water cooled.	(1)	(1)	(1)	(1)	(1)

[1] Experimental. Data not available.

VISIT TO KAITEK, CHINA, AVIATION FIELD

On April 23, 1930, a visit was made to Kaitek, a flying field in China which was being used by the Royal Air Force units attached to H. M. S. *Hermes*. This field is located about 2½ miles toward the sea from Victoria, Hong Kong. The visiting party proceeded by boat and landed at a small jetty on the concrete sea wall which extends across the entire breadth of the field. No runways were noted, but mounted on the sea wall at the landing was a power crane used for hoisting in and out their seaplanes. The party was met by several British Air Force officers and conducted to field headquarters, where refreshments were served, after which an inspection was made of the various field activities.

The field at Kaitek is classed as an emergency landing field, as a provision of the disarmament pact of 1922 prevents the British from building an air base in their north Pacific possessions. However, all planes from the *Hermes* operate from it during the winter period of five or six months.

The field is mostly made ground, pumped in from the bay. The surface is very hard and smooth, partially covered with grass. It is about 700 yards long and 250 yards wide, surrounded on three sides by precipitous hills and on the fourth side by the bay. Work is being carried on to enlarge the field on the seaward side, and it appears that it can eventually be increased in width to about 600 yards. Flying conditions over the field are usually bad due to low clouds, fog, and extremely rough air. All of the buildings on the field were of wood and palm construction, similar to the Nipa shacks

of the Philippines, except that the poles were all sunk into concrete foundations and the main lashings were of wire. It is understood that they have withstood several typhoons with only minor damage to roof covering. Along the western side of the field are the shops where minor jobs of surface repair work are done. No facilities exist for any considerable repair work, such as wings, fuselages, etc., they being equipped only for upkeep work such as any operating squadron could perform. No flight personnel was assigned to the field nor any planes. The permanent personnel consisted of about 50 men as station crews; the flight personnel attached to the *Hermes* or any other carrier coming in bring their planes and equipment from the carrier and used the field as a base during the stay in Hong Kong. However, when the carrier departs some few planes are usually left behind for minor repair work, so that rarely is the field without planes. It is understood that they experience the same difficulties with dope work due to dampness that are encountered in Cavite and that practically all of their engine work is done aboard the carrier owing to lack of adequate shelter from dust and dirt at the field.

All personnel formerly lived at the field in grass buildings but have recently taken over an old rope factory situated about 1 mile from the field. This mess consists of about 27 officers. The wardroom is pleasant and officers' rooms, while not particularly homelike, are adequate and fairly comfortable.

The attitude of the officers toward us was most pleasant and they did everything within their power to make our visit agreeable. They all appear to be contented with their work and to have entertaining outside interests. The flying officers were all comparatively new in aviation and were keenly interested and well informed on this subject. They volunteered a great deal of information which they thought we would be interested in.

The enlisted personnel presented a very excellent appearance, were energetic, and appeared to be thoroughly contented. Officers and men appeared to be in excellent physical condition, practically all of them keenly interested in some form of athletics. All flying witnessed was very smartly performed with the exception of one bad seaplane landing which resulted in damage to the floats. The tour of duty for officers of the Royal Air Force on the Asiatic Station is four years while that of the Royal Navy is about two and one-half years. It is understood that the *Hermes* is due to return to England for a short overhaul late this summer.

Three types of planes were in evidence, 9 Fairey "flycatcher" single-seat fighters, 6 three-place bombers, and 4 old Fairey twin-float seaplanes, which number it is believed constitutes practically the entire air force in commission attached to the *Hermes*.

The fighters were equipped with radial air-cooled motors, having two throw cranks. The wings were fitted with "flaps" on the trailing edge, which probably explained the quick take-off and slow landing speeds observed. They were represented as being very heavy and stunted well, but could not be held inverted because of the weight. The tail surfaces seemed to be much smaller than is usual in our planes. The landing gear is of an oleo type, with an unusual strut arrangement. These planes are equipped with a fixed machine gun firing through the propeller, a telescopic sight similar to our own being mounted on the cowling directly in front of the pilot. There were also ring sights mounted to the left of the telescopic sight. On the outside of the fuselage was a very ingenious system of small metal flaps about two inches square, used for signalling while in formation. The codes for this signalling system were mounted on aluminum holders contained in the cockpit. The bombers were all new planes, three place, equipped with a 450-horsepower Napier Lion engine. Metal propellers were used. The bomb racks used were similar to ours. A fixed gun is carried in the right upper wing and another one is mounted in a groove in the left side of the fuselage and fires through the propeller. A free gun is carried in the rear cockpit. Fifteen-pound practice bombs were being used for their practices. The speed of these planes was said to be 130 miles per hour, the landing speed was slow and the take-off comparatively short, climb excellent. It was stated that these planes were designed the latter part of 1927 and had been on this station but a short time. They are all in excellent condition. They were all equipped with the slotted wing and are of metal construction. The four seaplanes were twin-float, single-engine jobs built by Fairey and were all old and in poor condition. They were equipped with a tail float and a water rudder on this float. Their performance was very poor, and no one cared to fly them. Wooden propellers were used on the pursuit ships and on the seaplane. Each plane has its officer pilot who is responsible for the condition of the plane.

BRITISH AIR STUNTING ON ASIATIC STATION

While en route from Yokohama, Japan, to Chefoo, China, vessels of the Thirty-eighth Destroyer Division witnessed a division of six British fighting planes operating from aircraft-carrier *Hermes* in the vicinity of Wei Hei Wei, China. These land planes executed section and division tactics, broke formation, stunted independently, and dove on ships of the Thirty-eighth Division in simulated light bombing attacks. Apparently the show was in the nature of a welcome to the Thirty-eighth Division, with whom the British Navy

has been friends in may parts of the world. Acrobatics noted were plain loops, Immelman, inverted flying, snap stalls and dives, fast double rolls, slow single rolls, and cart wheels. Estimated downwind speed passing the ship (wind force 3) 175 miles an hour in level flight.

These planes apparently were fitted with floatation gear and "Oleo" landing gear. The stunting appeared smooth, and in general the flying was excellent.

THE FLEET AIR ARM

The following taken from a recent article by Wing Commander C. E. Maud, Royal Air Force, gives an illuminating close-up of the history, organization, and function of the Royal Fleet Air Arm:

> The activities of that portion of the Air Force which supplies the air needs of the Navy, called the Fleet Air Arm, are little known. Before describing how the present organization grew up, a brief survey of the growth of flying in relation to sea warfare and of the difficulties inherent to its development will be useful.
>
> At the beginning of the war 1914–1918, flying was still in its infancy. No country had more than a few airplanes, of primitive design, capable of little more than straightforward flying under good conditions. Under the stress of war progress was rapid, particularly on the military side. More powerful and efficient machines soon began to be produced. It was not long before the Royal Flying Corps, charged with supplying the air needs of the Army in all theaters of war, had grown out of all recognition both in numbers and in technical equipment.
>
> At sea conditions were different. The Royal Naval Air Service, which had come into being in 1914, shortly before the outbreak of war, was a lusty infant, full of energy and determination, but unfortunately it lacked the means of applying its energy with the fleet at sea.
>
> For aircraft to operate successfully with the fleet they must first of all be present with the fleet; this involves the provision of a ship to carry them.
>
> In the early days of the World War, a few small vessels, cross-channel steamers, such as the *Empress* and *Engadine,* were taken up by the Admiralty and fitted to carry seaplanes. Later on a larger ship, the *Campania,* was similarly adapted; and certain warships were fitted with special platforms to carry a small single-seater fighter which could be flown off to attack Zeppelins or other enemy aircraft.
>
> These steps met with a limited measure of success, but the seaplanes were generally inefficient (judged by modern standards) and could seldom be relied on for action when required. The fighter aircraft, when flown off, could not land on again, and had either to return to a shore base or (if out of reach of land) land in the sea alongside a ship in the hopes of being picked up.
>
> Almost throughout the entire course of the war the fleet at sea was thus deprived of any real or effective air cooperation—not from any lack of skill or determination on the part of the flying personnel, nor from lack of appreciation of the value of aircraft by those responsible for sea policy, but simply through lack of technical development in aircraft and ships to operate them.
>
> Subsequent development leading up to the present state of efficiency belongs almost entirely to the postwar period, and dates from the development, as an efficient unit of the fleet, of the large aircraft carrier such as the *Argus, Eagle, Furious,* and later ships, which are practically floating airdromes.
>
> At the beginning of the war, the scope or possibilities of aircraft in their different rôles were not fully envisaged. But as the war progressed and more experience was gained, the proper functions of aircraft began to emerge more clearly.
>
> These functions may be divided into three main categories:
>
> (1) Reconnaissance, including observation for gunfire and air photographs;
>
> (2) Air fighting; and
>
> (3) Bombing.

The work of the Royal Flying Crops and of the Royal Naval Air Service employed on land service was divided into these categories long before the end of the war. In April, 1918, the Royal Air Force was formed by the merging of the Royal Naval Air Service and the Royal Flying Corps into a separate service, independent of the Navy and Army. After the war, when the first real aircraft carriers came into commission, and the science of deck landing had been mastered, and the development of naval aviation had really begun to be pushed forward, different circumstances arose and a new problem began to demand attention.

Of the three main functions of aircraft in war, probably the most important, from the naval point of view, is reconnaissance. The other two, air fighting and bombing, are more in the nature of independent air operations not directly affecting the work of the ships, though still of course controlled by the Commander in Chief and coordinated with the other activities of the fleet. But reconnaissance demands the closest cooperation between aircraft and surface vessels, and the gravest issues may hang on its success or failure.

Air reconnaissance at sea is different from, and in many ways more complicated than similar duty on land. War on land is more or less static, whereas at sea it is always on the move. Even in "open warfare" the movement of armies is comparatively slow, and objects under observation do not move—or only very slightly—in relation to the observing aircraft. At sea the whole of both sides is continually on the move and in any direction; and the aircraft is over the open sea with no landmarks to guide it.

At the end of the war the number of officers of the Navy or Air Force with knowledge of their special duties was naturally very limited; after the war the number became even smaller, due to demobilization and transfer to other duties, etc. By this time (1919–20) the Royal Air Force was responsible, at least in theory, for the supply of all flying personnel, whether on land or at sea. So far as the pilots were concerned the necessary number could be, and was, provided by the Royal Air Force.

But the supply of observers was a different matter. In view of the special nature of their duties the deficiency in this respect could not be made good from the general ranks of the Royal Air Force; on the other hand, it appeared that naval officers, by their ordinary naval training, were peculiarly adapted for the duty, given the necessary air training.

Therefore, it was agreed between the Admiralty and Air Ministry, in 1921, that the work of air observation at sea in future should be undertaken by naval officers, and this policy has been continued ever since. These officers, lieutenants or lieutenant commanders, are given a special course of training, partly naval and partly air, to qualify them for their duties; but they are in no sense attached to the Air Force, and remain entirely naval officers, whose special duties take them into the air as and when required. In fact, naval observing is now included as one of the recognized specialist branches of the Navy, on the same footing as gunnery, torpedoes, or navigation.

Incidentally, the great importance and responsibiliy of the observer in sea reconnaissance has given rise of late years to anxious discussion whether he, rather than the pilot, should not be regarded as Captain of the Aircraft. This question has more in it than one may at first imagine, and is not one to be lightly dismissed with a hasty answer. Certainly, it deserves fuller consideration than I am able to give it here. There is much to be said on both sides.

From 1921 for a period of three or four years the policy as regards the supply of personnel for naval air work was that the Air Force supplied the pilots to fly the aircraft, while the Navy supplied the observer for the special duties of reconnaissance and spotting. But as the service expanded and more experience was gained, this policy was found to be not altogeher satisfactory.

At sea all flying is done by officers; so that a large aircraft carrier would have on board (apart from naval observers) between 30 and 40 officers who would be solely concerned with their flying duties, and, not being naval officers, would be ineligible to perform any naval duties in connection with the ship. This, to the Admiralty, appeared to be a somewhat uneconomical state of affairs. It was argued that if, in addition to the observing, the flying also (i. e., the actual piloting) were done by Naval instead of Air Force officers, then these officers would be available for ordinary ship duties when not actually engaged in flying, and considerable economy would result. Lengthy discussion on this subject took place between the two departments during 1921 and 1922. Finally, in the absence of agreement, it was decided by the

Government early in 1923 to refer the whole question, together with other cognate questions of national defense affecting the three services, for consideration by a specially appointed subcommittee of the Commitee of Imperial Defense.

The terms of reference to this committee were wide; indeed, so wide that it was deemed advisable by the committee to remit to a special subcommittee of three of its own members one of the many matters on which it was asked to report, viz, "To inquire into the relations of the Navy and Air Force as regards the control of Fleet Air Work." This special subcommittee of three, after a detailed inquiry into the whole question, presented its report to the main committee in July, 1923.

The report and recommendations, which were in the nature of a compromise between the views put forward by the two departments, together with the remarks of the main committee thereon, were adopted by the Government and published in August. The committee left the settlement of the actual personnel proportion to the Admiralty, subject to the provision that the proportion of Air Force officers serving on air duties in the carriers should never fall below 30 per cent. The expression "Fleet Air Arm," which was afterwards accepted as the official designation of the new organization, was first used officially in this report.

In the summer of 1924, after various points of procedure and regulation had been settled, the first batch of naval officers was selected and put under training as pilots. These officers completed their training and passed out to the fleet as service pilots in the spring of 1925. It is from this time that the organization of the Fleet Air Arm on its present basis may be said to date.

For the purpose of command and discipline when dealing with their aircraft and technical personnel, the naval pilots are given temporary Air Force commissions as flying officers and are known as "attached" to the Air Force. This is also necessary to regulate their position as combatant flying officers when landed with their flights at a Royal Air Force shore base. They retain their naval rank and continue to wear naval uniform, being described officially as "Lieutenant ———, R. N. (Flying Officer, R. A. F.)." They are eligible for promotion in their Air Force rank independently of their naval rank; and within the last few years several naval pilots have been promoted to flight lieutenants, Royal Air Force, and given command of Fleet Air Arm flights.

When at sea, although their air duties take precedence, they are eligible and available for all ordinary naval duties when not actually required for flying. Marine officers are eligible equally with their naval conferees for employment as pilots, though not as observers.

Technical personnel for the maintenance of aircraft continues to be supplied by airmen of the Royal Air Force, with the exception of the men of certain trades common to the two services. By an extension of the principle already adopted by officers, it was agreed between the Admiralty and Air Ministry that where possible in the Fleet Air Arm airmen should be replaced by naval ratings of equivalent trades. In this way Air Force wireless telegraph operators have been replaced by naval telegraphists, Air Force carpenters in certain cases by naval shipwrights, and all unskilled "aircraft hands" by able seamen.

Thus, the Fleet Air Arm now consists of a combination of Air Force, naval and marine officers as pilots, of naval officers as observers, and of a mixture of airmen, seamen, telegraphists, and sometimes even stokers and marines for other duties. Naval pilots and observers are not interchangeable. They do entirely different courses of training, and each sticks to his own job throughout.

The operational unit in the Fleet Air Arm is the flight. For a time in the early days the squadron organization was used at sea, but it was found that the squadron as a unit was too large and not flexible enough to meet the special requirements. An aircraft carrier requires for fleet work small numbers of different types of aircraft rather than a large number of the same type; and with the earlier organization the squadron was apt to find its flights split up and distributed in two or more carriers, perhaps not even in the same fleet, which was obviously unworkable.

Therefore the "flight" organization was adopted in place of the squadron, each flight being a self-contained operational unit with its own service number, capable of moving complete from place to place or ship to ship as required.

A Fleet Air Arm flight consists of six aircraft (as opposed to four or five in the flights of Air Force squadrons ashore), with six pilots—usually a flight-lieutenant, Royal Air Force, as flight commander, one flying officer and four naval pilots; or else a lieutenant commander or lieutenant, Royal Navy, as

flight commander, two Air Force flying officers, and three naval pilots. In reconnaissance flights six naval observers are included in addition.

For administrative purposes each flight is usually allotted to one aircraft carrier, and remains with that carrier for the length of the commission, with temporary spells at a shore base during leave periods or when the ship is docking, etc. In addition to its service flights each carrier has a headquarters flight consisting of a wing commander (known as senior Royal Air Force officer) and squadron leader, with an air force adjutant and technical and stores officers, and a small headquarters staff of clerks, storemen, workshop personnel, etc. The whole organization is subject to naval discipline when embarked, and is directly under the orders of the captain of the ship, the wing commander being responsible to the captain for all flying operations and for the efficient maintenance of the flights.

For operational purposes three types of flights are provided for the three broad functions of aircraft enumerated above. These are the spotter-reconnaissance flights, the fighter flights and the torpedo-bomber flights. The main functions of each of these flights is clearly indicated by its title.

The spotter-reconnaissance flights are responsible for all fleet air reconnaissance and for spotting for gunfire. In these the chief duty falls on the observer.

The fighter flights have the same duty as that of any other fighter aircraft, i. e., the destruction of enemy aircraft, with the added duty of machine-gun attacks against exposed personnel on bridges or decks of enemy ships if opportunity offers.

The torpedo-bomber flights are in a special category. The torpedo is a weapon peculiar to naval warfare, and the duty of the torpedo-bomber flights is to exploit the use of this weapon from the air, with bombing as an alternative function.

The relative value of the torpedo and the bomb for use by aircraft against ships is a matter of argument, and there is considerable difference of opinion on the subject. My own opinion—a purely personal one—is that the torpedo will always be the more efficient and the more dangerous weapon. My impression is—no doubt the bombing experts will correct me—that the bomb is not yet a weapon of precision. For use against "area" targets on land, such as a factory, a dockyard, or a railway terminus, the bomb is admirable. There the exact point of impact is of secondary importance, so long as it falls within the area it is fairly certain to do some damage. Also its moral effect may be considerable.

At sea, however, where the target is so much smaller and will probably be moving at high speed, conditions are much more difficult. Only a direct hit or a very "close miss" will do any damage; whilst the moral effect—amidst all the other uproar of a naval battle—is likely to be nil.

The torpedo, on the other hand, is a very definite menace at sea, and the airplane with its high speed and great mobility is an ideal carrier, provided it can get close enough to insure a hit. For these reasons, it seems that the torpedo is always more likely to be used by the heavy-weight carriers of the sea-going aircraft, and that bombs would only replace the torpedo when all the latter have been expended.

Pilots (Naval or Air Force), on completion of their elementary flying training, are selected for one or other of these three classes of flights and are given a further short course in the handling and use of the particular type of aircraft with which their flights are equipped, and in the art of deck landing. They are then posted to a service flight in one of the aircraft carriers with the fleet at sea.

Such is the organization of the Fleet Air Arm as it exists at present.

THE ATTACK OF DAYLIGHT BOMBING FORMATIONS

The following is quoted from a recent article by Air Commodore C. R. Samson, Royal Air Force, on the subject of the attack of daylight bombing formations:

> The problem of how to attack bombing formations is a very important one. Yet there are very few actual data to guide us in its solution, and remarkably few practical trials have been carried out of late years. But, as the result of experiments with which the present writer was closely associated over a period of two years, certain methods were devised.

Before proceeding further it is necessary to note some general aspects of the subject. Firstly, in the present state of the Royal Air Force, pilots are constantly being moved from squadron to squadron; thus they never settle down for any length of time. Some of the pilots have a great deal of experience, others have none. Flights are commanded in many instances by pilots with only 18 months' service. The same thing will, of course, happen in war time after the first few days of fighting owing to casualties and the rapid expansion of the service. Therefore our combat tactics must be simple in order that newly joined pilots can rapidly become useful members of a squadron.

It must also be borne in mind that the present day single-seater fighter (S. S. F.) provides a very obstructed arc of vision for the pilot. This must be taken into account when devising tactics demanding close formation work. Our combat tactics must be based on close-order flying, otherwise our assaults will tend to be indecisive and our squadrons will split up. The provision of a free field of fire for each airplane and lack of mutual interference is highly important. The size of the formation and subformation that can be handled is another factor. Lastly, intercommunication between the leader, sub-leader, and other pilots needs consideration.

Up to date, our tactics have been forced to follow the design of our S. S. F.; this is quite wrong. The correct method would seem to be to design the fighter so that it can comply with the main requirements of our tactics. The ideal situation is reached when the weapon, i. e., the fighter, is constructed and armed so as to provide the maximum efficiency in the best form of assault.

When we come to consider the bombing formation that has to be attacked, it is as well to proceed on the assumption that, airplane for airplane, the bomber has greater gun power; also, individually, their speed may be nearly as high as the fighter. The speed of a formation, however, is a good deal lower than that of a single airplane, and the larger the formation the slower will be its speed. It is possible for airplanes of inferior speed to attack those of superior speed, but they must approach from a direction before the beam. The greater the speed superiority of the attacker, the larger the number of assaults that can be delivered in a certain period. Speed superiority also permits of the attackers getting to close quarters from a rearward position.

Certain gunnery features of bombers merit consideration. It is a well-known fact that it takes a considerable time to train a gunlayer of average ability to handle his weapon properly when standing up in the full blast of the slip stream. The rear top gunlayer in a bomber is generally so exposed when he is standing up that in many cases he will be a negligible factor. This means that an attack from below will probably suffer less from gunfire than an attack from above. In the latter case the gunlayer of the bomber is crouched down in a sheltered position, well braced up, and therefore able to produce well-aimed fire. The provision of gun turrets well greatly improve the gunlayer's efficiency.

The nature of the formation used by the bombers must to a certain degree affect our tactics. We must also bear in mind that the armament of the bombers may vary according to their position in the formation. But these features should not prevent us from following certain main lines; in any case, it is evident that we can not have a different scheme of attack to deal with every formation of the enemy, for the training of our pilots, under the present system, precludes efficiency in more than two or three methods of attack. Special squadrons with pilots of high individual capability, who have been together for a long time, doubtless will be able to assimilate quickly any new method; but the average squadron would undoubtedly fail if too much were asked of it.

The size of the bombing formation is another factor. I, personally, hold the view that the bigger the formation the easier it is to attack it, for the following reasons: First, there is more battle room for our fighter squadron; secondly, the enemy is slower and less maneuverable; thirdly, his leader is more out of touch with what is happening to his flank airplanes.

Now, our tactics must be based on a standard system. In this, the flight is the lowest unit. So many flights make the squadron. When two or more squadrons are present they work together, synchronizing their assaults. Each flight acts as cover for the other flights. Each squadron acts as cover for the other squadron. Every airplane in the whole force is providing and receiving cover. In fact, the principle is to attack and make off in reciprocating cover. In other words, a fighter squadron may be likened to a boxer with three or four hands, each hand being a flight. In the light of experience

there can be little doubt that the correct number of airplanes in a fighter flight is three. Properly trained, they can work practically as one airplane; their maneuvers are rapid, and they can produce a heavy and well-aimed fire. Any greater number would only reduce the maneuverability of the unit. In the air, the squadron should consist of four flights, thus providing a re-inforcement by throwing in the fourth flight to replace casualties in the first assault.

The correct procedure must undoubtedly be for the fighter to endeavor to secure fire superiority against a portion of the bombers' formation, with the object of destroying the formation in detail. To obtain this we must attempt to get practically simultaneous fire from each airplane of each flight against one bomber. It is impossible in practice to obtain simultaneous fire from three airplanes on one but we can attain something approaching it. Therefore we must attack with each flight simultaneously on certain bombers, preferably with a view to facility of maneuver, selecting the wing bombers.

In each flight the airplanes attack, one or two from above, and one from below; or vice versa; and practically simultaneously. This method provides each fighter with sufficient space and time for a well-aimed burst of fire. Well-aimed fire is all important. At present, until further improvements in guns and sights are made, deflection shooting must not be attempted. Against certain types of airplanes and various formations a flight may attack two bombers at once, but as a general rule, only one is attacked.

Under this system, then, we have the whole squadron of nine airplanes attacking three bombers. This seems, on the face of it, a wasteful procedure; but it will be found that, in practice, we are following sound principles, for we are attempting to destroy the enemy in detail, and concentrating a superior force against an inferior one. Also by this method we are maintaining the cohesion of our flights and squadron, and thus preventing the combat from degenerating into an indiscriminate mêlée.

After each assault, the flights break off, reform, and repeat the attack without loss of time. The number of attacks are governed by the speed superiority of the fighters, ammunition supply, and fuel capacity. One advantage of this type of attack is that it prevents waste of ammunition at long range, which is liable to happen with inexperienced pilots.

Without going too closely into the actual details of the assault it seems that the fourth flight can be used either to attack with the other three flights or to act as follows:

(1) Feint attack on enemy leader;
(2) Provide cover in case the enemy are escorted;
(3) Deal with airplanes broken off from the main formation;
(4) Replace casualties in the flights.

Having dealt briefly with the nature of the attack, it is as well to consider from which direction it should be launched. There can be no doubt but that, whenever possible, it should be from a position above and ahead of the enemy. Unless we have enormous speed superiority, attack from astern is fatal, as we then have a slow approach generally ending in a flat dive, coupled with exposure to maximum fire. From ahead, the fighters have the advantage of initiative, air room, and air speed; also, as a general rule, they will be less exposed to the bombers' fire, because the fixed front guns of the bombers can not bear on the fighters unless the bombers carry out complicated maneuvers. Added to this, is the advantage of the fighters being between the bombers and their objective—either the target or their home.

Another factor affecting the problem is the natural reluctance of the bombers to maneuver, because every maneuver will delay their mission, and also tend to break up their formation. The advantages of attacking the flank bombers first are that in this area is found the least fire, as the opposite flank are at too long range for effective shooting. Again, the whole fire system of the bombers may be put out of action, as each fighter flight is engaging simultaneously, and human nature will make those bombers which are attacked fire at the actual airplanes that are attacking them to the neglect of those that are attacking their fellows.

In conclusion, it may be remarked that any attack which my be devised for fighters against bombing formations appears simple enough on paper, or when worked out on a blackboard; yet, when it is tried in the air, many difficulties are soon discovered. It is only by constant experiment and practice that success can be assured.

JAPAN

ORGANIZATION OF JAPANESE NAVAL AIR FORCE

The Japanese Naval Air Force is organized to meet the requirements of two major missions: (1) Fleet air forces; (2) air patrol and defense of the entire coastal area of the Japanese Empire.

Fleet Air Forces

While the aircraft squadrons are organized as a separate unit under the commander in chief of the combined fleet, they operate either as a unit with either fleet, or part with each fleet, as necessary. (The combined fleet is divided into two main units: The First Fleet—corresponding to our Battle Fleet—consisting of all the battleships, with appropriate light forces; and the Second Fleet—corresponding to our Scouting Fleet—composed of the four battle cruisers, all the large cruisers, large destroyers, and large radius, high-speed fleet submarines.)

Aircraft carrier and tender planes

Ship	Type of plane	Number of squadrons	Number of planes	
Akagi	Type 10, pursuit	2	32	
	Type 13, torpedo and bombing	2½	40	72
Kaga	Type 10, pursuit	2	32	
	Type 13, torpedo and bombing	2½	40	72
Hosho	Type 10, pursuit	1	16	
	Type 13, torpedo and bombing	1	16	32
Ryujo	Type 10, pursuit	1	16	
	Type 13, torpedo and bombing	1½	24	40
Notoro	Type 14, reconnaissance	½	8	8
Wakamiya	do	½	10	10
	Total	14½		234

Battleship and cruiser planes

Each battleship, battle-cruiser, and 7,100-ton and above cruiser division, has attached to it one aircraft squadron composed of the planes carried on board the ships of that division, the squadron leader being on board the division flagship. Each vessel of the above types carries two type 14 reconnaissance planes.

Organization

Fleet unit	Type of plane	Number of planes
First fleet:		
First division (BB)	Type 14, reconnaissance	4
Second division (BB)	do	8
Second fleet:		
Fourth division (BC)	do	8
Fifth division (CL)	do	8
Sixth division (CL)	do	8
Seventh division (CL)	do	8
Total combatant ship planes		44

Aerial patrol and coastal defense forces

That part of the naval aviation forces charged with coastal patrol and aerial defense of the coastal areas are shore based and in case of war would be concentrated at the three principal air stations, viz, Kasumigaura, Yokosuka, and Omura. Units from these bases would operate from the aviation fields and advanced bases located in the seven islands of Izu, the Bonin Islands and at the entrances to Tokyo Bay, and the Inland Sea. In case of necessity the entire shore based aircraft organization can be quickly and easily concentrated at any of the three main aviation stations.

Summary

In time of war all planes carried by ships and all shore based planes would be maintained in active operation giving a total air force as follows:

	Number of planes
Afloat:	
Aircraft squadrons	234
Capital ships and cruisers	44
Shore based	256
Total	534

Domestic manufacture and any stored reserve would be depended upon to maintain or increase the number of planes in operation.

No hurried or emergency training of pilots to man this force would be necessary as at the present time there are 259 officer pilots and 330 enlisted pilots; a total of 589 pilots in active service in the Japanese Navy.

Of the total of 17 shore based squadrons, 11 are based in the Yokosuka Naval District (Kasumigaura, Yokosuka). This is explained by the fact that the Bonin Islands and the mandated islands are under the administration of the Yokosuka Naval District, hence the responsibility for the air defense of these areas devolves upon that district; consequently Yokosuka district has been supplied with sufficient planes for this purpose.

It should be noted that the type 3 pursuit plane—a single seater, Gloster fighter with 450-horsepower Bristol Jupiter engine will replace the already obsolescent type 10 pursuit plane as sufficient numbers are built.

AVIATION TACTICS STUDIED AT JAPANESE HIGHER NAVAL COLLEGE

Vice Admiral S. Takahashi, president of the Higher Naval College, during a tour of inspection, which included the Imperial universities at Kyoto and Kyushu and the Sasebo Naval Station, is re-

ported to have made the following remarks respecting Japanese naval aviation:

> In giving instruction on the subject of tactics in general at the Higher Naval College, I intend to lay stress on aviation tactics, since it goes without saying that in the future naval warfare, aircraft will play an important part.
> Due to financial reasons it is impossible to include both the aircraft carriers *Kaga* and *Akagi* in the aircraft squadron; besides, fleet maneuvers are not necessary for aircraft carriers to the same degree as they are for cruisers and destroyers. I should think it more important to study new tactics for aircraft carriers in which three carriers are combined into one squadron and placed in a triangular position 100 or 200 miles distant from each other, so that in reconnaissance or attacking flights the radius of action of the aircraft may be increased.

CIVIL AVIATION

Japanese civil aviation has in no way reached the degree of development attained by occidental countries. However, in the last few years, a few improvements have been realized, such as promulgation of the air aviation law, and establishment of air routes and the Japan Air Transport Co. A survey of outstanding accomplishments during the last year include:

(1) December 1, 1929: Total number of airplanes, 120; an increase of 20 some odd airplanes since December 1, 1928, greater number of these planes equipped with 400 horsepower engines.

(2) December 1, 1929: Total number of pilots and engineers, 300; an increase of 30 some odd pilots since December 1, 1928.

(3) Performance of Japan Air Transport Co: Mileage flown on regular routes, April to October, 1929, 341,875 miles, without any accident involving casaulty.

Number of passengers carried: July 15–Oct. 1, 1929		1, 568
Mail carried: Apr. to Oct., 1929	pounds	10, 354
Freight carried: Apr. to Oct., 1929	do	2, 806

Regular flights are also carried out by other companies than the Japan Air Transport Co. A regular air service of six round-trip flights a week is maintained between Osaka, Takamatsu, and Matsuyama, carrying passengers, freight, and mail by the Japan Institute for the Study of Air Transportation. The Asahi Shimbun established an air-mail route from August to October, 1929, between Tokyo and Niigata of three round-trip flights a week. Further, airplanes are used to search for schools of fish, advertisement and propaganda, and for sightseeing trips.

The Japanese press recently reported that formal permission had been granted by the Chinese Government for a series of test flights between Fufuoka, Japan and Shanghai, China, for the purpose of establishing an air route between the two countries. Orders were at once issued to the Japan Air Transport Co. to make the following preparations for the test flights:

Type of plane to be used: Dornier Wahl equipped with two 600 horsepower engines.

Route; Fufuoka—Ariakekai—Kuchinotsu—Tomien—Shanghai; total distance, 540 miles.

Time required for flight: 5½ hours.

FRANCE

THE MUREAUX M. B. 35 SEAPLANE

This is a monoplane with lowered wing surface, equipped as a two-seater and provided with a Salmson 120 horsepower air-cooled engine. It has been specially designed to allow of rapid dismantling and mounting, stowing in a very small space, easy upkeep and repairing and all this without detriment to aerodynamic qualities.

This machine is expressly designed to be taken aboard submarines; it is the only two-seater seaplane for submarines. It may also be used as a ship's reconnoitering and training machine. The small space it requires enables it to be carried even by light units. By virtue of its low power and low consumption, it is a particularly economical machine for the training of pilots on board ships, reconnoitering and coast-guard work. The machine can be rapidly stowed away in a special small-sized case, which serves as a hanger and in which the mechanic retains easy access to the engine in connection with its upkeep. This hangar case may be provided with an axle and two removable wheels, and can thus be taken from one place to another behind a tractor or motor car, like an ordinary trailer.

The operations of erection and dismantling of the seaplane require no skilled labor or special tools. Dismantling and stowing in the tube or taking out of the tube and erecting is carried out in less than 10 minutes.

The two passengers, seated side by side but slightly displaced, can communicate by word of mouth. The passenger's seat may be replaced by a removable fuel tank, which will increase the range of the machine as a single-seater. It carriers a semiautomatic camera with 50-centimeter focus completely inclosed in the fuselage; this camera can be controlled either by the passenger in the two-seater or by the pilot in the single-seater. This camera may be replaced by an entirely automatic camera. A wireless set may also be installed with controls within reach of the pilot. The engine is provided with a Saintin carburetted air starter.

The fact that it is light in weight and detachable gave rise to doubts as to the ruggedness of this machine. Experience has shown that the rugged quality is not lacking.

The prototype, after having undergone numerous erecting and dismantling demonstrations at the works before various inspection and control committees, went through its flight, adjustment, and acceptance tests in the Paris district, each flight requiring the erection and dismantling of the machine. Delivered at Saint-Raphael, it carried out further demonstration and additional acceptance tests. The practical engineering center at Saint-Rapheal then effected systematically a long series of erecting and dismantling operations with the double object of training the staff and verifying the ruggedness of the machine, which was afterwards delivered to the navy. This same prototype was then loaded and put in service on board the cruiser *Jeanne d' Arc*. In the course of a year during which this training-ship made a cruise round the world, the M. B. 35 had the opportunity of flying in many latitudes and made more than a hundred flights (each flight being compulsorily attended by an erecting and dismantling operation) without any overhauling or repairing, and without a single spart part. The French Navy then decided to put this type of machine into service on light units.

It is understood that an order for a number of these machines has already been executed and delivered. One of these machines was carried on board the cruiser *Duguay-Trouen*, which made several cruises in the eastern Mediterranean. Another on board the *Jules-Michelet* was subjected to the severe climate of the China seas. The Argentine and Brazilian Governments were interested in the demonstrations of the machine carried by the cruiser *Lamotte-Picquet*. Special mention should be made of the machine used by the *Primauguet* on its last cruise round the world. This cruiser had no special hangar case available, so that the seaplane remained dismantled and stowed on deck. Throughout the voyage it had to bear varied weather conditions, with violent squalls and breakers. Among the most interesting flights are to be mentioned those carried out at Djibouti and the voyage from Saigon to Angkor (745 miles). During the whole of this cruise, lasting more than 8 months, the M. B. 35 seaplane remained on deck without hangar or shelter of any description, and effected more than 100 hours of flight, for the most part in tropical countries. This voyage constituted a satisfactory demonstration of the ruggedness of this small machine.

FRENCH AIR MINISTRY'S ATTITUDE ON ZEPPELINS

The French Air Ministry is represented as seeing practically only commercial utility for dirigibles to-day, with no land military value whatsoever, in view of the superior speed and climbing power of fighting airplanes, and only a very slight naval value as eyes of the fleet at sea. The budget of the French Air Ministry for 1930 con-

tains no appropriation for dirigible experiments. The Government, in fact, has no dirigible policy, and has had none since the *Dixmude*, turned over to France by Germany after the war, was lost over the Mediterranean with her crew. The World War proved conclusively that dirigibles were no match for airplanes or for antiaircraft artillery on the ground. The German records show a very high proportion of losses for the few dirigibles that were sent out to bomb Paris or London. Small dirigibles, not Zeppelins of the size of the *Graf*, are still held indispensable for use with naval fleets. They can operate much slower than planes, so as not to run ahead of the cruisers. The French Navy has several small dirigibles, but no more are to be built for the present. France is watching with interest the lighter-than-air experiments in Germany, England, Italy, and the United States.

COMMERCIAL AVIATION

On April 1, 1930, the air navigation service, charged particularly with functions respecting commercial aviation, was, in accordance with presidential decree, discontinued and superseded by the creation of three regional autonomous establishments for air navigation at Paris, Marseille, and Algiers, respectively, they being placed directly under the Air Minister. Commercial aviation in Tunis and Morocco are not included in the new regional establishment, but come under the authority of the chiefs of the airdromes of Tunis-Carthage and of Casablanca-Canes, which also are directly under the authority of the Air Minister. The directors of the three regional establishments and the chiefs of the two airdromes mentioned function as representatives of the Air Ministry. M. Ranvaise, former chief of the Bourget Airport, has been appointed director of the Paris regional establishment.

ITALY

FIAT PURSUIT PLANE

The pursuit airplane, adopted as standard by the Italian Air Force, is the Fiat Cr. 20 type. Modifications have recently been incorporated in this type, and it is now designated as the Cr. 20 bis type, the principal features of modification being as follows:

The wing spars are made of seamless drawn duraluminum tubing of parallelopiped octagonal shape with lightning holes. The spar is strengthened with internal duraluminum strip bracing secured with rivets. The main fittings to the spar are of steel secured by steel bolts.

The built-up duraluminum ribs are secured to the spar by means of steel tangs rivetted,

The main structure of the fuselage is of steel tubing.

The landing gear is of the open type, each wheel having a three-leg suspension, with vertical leg fitted with the Oleo system of shock absorber.

The tail skag consists of a shoe secured to a three-point suspension, the after or vertical leg is fitted with the Oleo system of shock absorber.

The flexible connections in the gasoline lines are Avioflex metallic tubing.

The plane is fitted with an adjustable stabilizer.

The main gasoline tank is made of duraluminum and is secured in place in lower part of fuselage just in rear of motor. It is covered with the Semape or French type of bullet-proof protection. The tank can be dropped by the pilot when desired.

The gravity tank is located in the upper wing above motor and is likewise covered with the above type of bullet-proof protection.

The wings and part of fuselage are covered with fabric; otherwise the plane is entirely of metal.

This plane is now equipped with two fixed machine guns, firing through propeller, as standard equipment.

The safety factor of this plane is said to be 18.

It is understood that in one plane of the Cr. 20 bis type has been installed the Isotta Fraschini Asso Caccia 420-horsepower air-cooled motor, and that this plane has been undergoing tests at the Malpensa air base.

The plane inspected was fitted with a Fiat A. 20 motor and it is understood that experiments are under way in the endeavor to utilize Ethel Glycol liquid in the radiation system. However, difficulties are understood to have been encountered in lubrication. Italy uses castor oil as a general lubricant on account of her lack of mineral oil supplies, and castor oil apparently does not satisfactorily withstand the heat involved.

MAGNETOS

An interesting type of aviation magneto developed by the Magneti-Marelli factory, located near Milano, is the single magneto for serving a 12-cylinder motor with four spark plugs to each cylinder. This magneto was developed primarily for the Fiat A–25, 1,000-horsepower, 12-cylinder motor.

This factory is now completing a magneto for the special Isotta Fraschini Asso Duo 800 type motor, 1,800 horsepower which is to be employed in the Macchi M–67 type plane. It was stated that this magneto could be advanced 52° mechanically, advance being effected by a central worm shaft which when pushed turns the rotator, thus accomplishing the advance of the magneto in a similar

manner as if the drive wheel of the magneto were unmeshed and reset to give the required advance. The fore and aft movement of the worm shaft is opposed by a spring so that when the pressure on worm shaft is released the worm shaft returns to normal position and setting of magneto. The revolution speed of the magneto was stated to be 6,000 when motor revolution speed was 2,300.

It is also understood that this factory has developed another new type of magneto, and although it is now completed, it will not be put in production for about one year. This magneto employs five cylindrical magnets in place of the horseshoe type now used. These cylindrical magnets are about the size of the middle finger of a normal hand, are of cobalt steel composition, give a stronger magnetization than the horseshoe iron magnet, and will retain magnetization for a longer period of time. This magneto will be more expensive than the present type and is designed especially for aeronautical motors. It is lighter, more simple in construction, contains fewer parts, and is of less over-all dimensions than the present type and is designed especially for aeronautical motors.

This company is also understood to have developed a special spark plug, but it is not yet in production. It is also understood that means have been developed to shield high tension leads from radio interference.

RIGID AIRSHIPS

The Italian Government has no rigid airships or dirigibles of any type in operation. All lighter-than-air operations in the Italian Air Force were discontinued about the same time that the Nobile North Pole Expedition came to grief. The only lighter-than-air activity in Italy at present is the employment of captive balloons for observation purposes. A small number of these balloons are operated under the engineering section of the army for military purposes.

NEW ITALIAN HELICOPTER DISPLAYED AT AIR PAGEANT

An elaborate air pageant was held on June 8, 1930, at the Littorian Airport. There were attacks on observation balloons, bridges, lorries, and an Arab village, together with numerous exhibitions of acrobatics. One of the most interesting of these episodes, which illustrated the progress made between the airplane of 20 years ago and the types just constructed, was a display of experimental machines. Of particular interest and importance was a new helicopter, the experiments upon which have been carried out with extreme secrecy. This machine, invented by Signor D'Ascanio, of Pescara, is, it is claimed, the first which has the power to leave the ground

vertically without any run, and to rise with perfect stability owing to the automatic incidence which the wings take out.

The helicopter is fitted with three small propellers on the fuselage, one forward, one astern, and one on the left side. These propellers enable the machine to fly forwards, backwards, or in a circle, and also to remain stationary in the air. There are two sets of revolving wings, the lower set revolving under engine power and the upper set revolving by wind pressure. Thus, if the engine stops in the air, the machine can descend perpendicularly like a parachute because the lower and upper wings will still revolve on account of the air pressure. Hitherto this helicopter has not risen more than 60 feet, but this height, it is claimed, can and will be increased. So far the models made seat only the pilot. In all, some 30 machines took part in the demonstration, which was witnessed by an enormous crowd and displayed the remarkable progress made by Italian aviation during recent years.

AERIAL CIRCUIT OF ITALY FOR LIGHT PLANES, 1930

There has been organized to take place in Italy, during the period August 15 to 31, a competition for light planes that will be known as the Aerial Circuit of Italy 1930.

In the past year considerable headway has been made in the development of light planes in Italy through the policy followed by the Air Ministry in creating squadrons of light planes under the Air Force for training purposes. Apparently with a desire to exploit this development and at the same time promote this form of aviation among the Italian people, competitions such as this are organized.

The following is a translation of part of an article appearing in the press of April 9, 1930:

> Last summer, as it will be remembered, Italy took part in the International Turismo Challenge, organized by the Aero Club of France, the principal test of which took place on a European circuit of 4,350 miles. The classification, which assigned the victory to a German competitor, provoked a claim on the part of the Aero Club of Italy. Many of the aviators had flown over forbidden zones near the Italian frontier, thereby shortening considerably the course and making a gain on the average velocity, a coefficiency of capital importance for the final classification. Our pilots, who had scrupulously followed the prescribed route, were treated very unfairly, and victory, which legitimately was theirs, was assigned to others.
>
> The Ministry of Aeronautics decided that Italy would not take part in the 1930 competition and organized a circuit of Italy for light sport planes, foreign as well as Italian, to take place in the summer of this year.

ORGANIZATION OF HYDROGRAPHIC DEPARTMENT OF BRITISH ADMIRALTY

The British Hydrographic Department is under the direction of the Hydrographer of the Navy, who is a captain or rear admiral of the Royal Navy and has had long experience as a surveyor and in command of H. M. surveying ships, as well as periods of administrative service in office under previous hydrographers. The personnel of the department consists partly of naval surveying officers but mainly of civilian officers, and their duties are organized in branches and sections as follows:

General hydrographic and scientific questions and the control of the naval surveying service are dealt with under the hydrographer by the assistant hydrographer and by the naval and civilian assistants.

Chart branch.—Compilation of charts from results of surveys and other hydrographic information received from H. M. surveying ships, other ships of the Royal Navy, the British mercantile marine and hydrographic authorities throughout the world.

Chart production and supplies branch.—Printing of charts compiled by the chart branch, and distribution of charts to the Royal Navy and to hydrographic authorities throughout the world, and the sale of charts to the Admiralty agent for distribution to the various subagencies throughout the world. This branch also distributes the navigational publications (sailing directions, tide tables, etc.) which usually accompany the charts.

The subbranches under this branch have the following self-explanatory titles:

Sailing directions branch.
Tidal branch.
Navigation branch.
Notices to mariners section.
Instruments (surveying) section.
Light list section.

The naval members of the staff are without exception trained surveyors specially selected from the naval surveying service or navigating officers specially selected from other branches of the Royal Navy. Officers for the naval surveying service are volunteers from the general naval service and join at an early stage of their careers.

They receive their training in the surveying ships and are required to undergo short courses in meteorology and the gyrocompass, but are not normally required to undertake tours of duty for instructional purposes.

The civilian members of the staff are entered, as the result of civil service examinations, direct from their schools, colleges, or universities and receive their departmental training after appointment.

THEORIES OF STRATEGY

By Captain Groos, German Navy

(*Note: A German naval officer reviews a recent volume by the well-known French naval writer, Admiral Castex.*—ED.)

A book has appeared in France under the title, Theories of Strategy, in which the most renowned of the French theorists on naval warfare, Admiral Castex, undertakes the systematic construction of a new theory of naval warfare, an attempt which, we must concede from the start, appears to have been successful in many respects. Of particular interest to us (Germans) is the fact that it stands in direct contradiction to many of the theories propagated by the Anglo-Saxon powers. The French Navy has at all times distinguished itself by its thorough and systematic studies of naval warfare, from which other navies have reaped great benefits since the time of the celebrated works of the Jesuit Father Hofte and Captain Morogues, the founder of the French Naval Academy. Although the results have not always been commensurate with this intellectual preparation, this may be primarily attributed to the fact that the best traditions of the French Navy were overthrown as a result of the French Revolution just at the moment when the decisive struggle with England had reached its climax.

NAVAL STRATEGY AS A SCIENCE

It lies in the nature of things that great military struggles should always be followed by a tremendous revival of the science of warfare and consequently the youthful science of naval warfare is now beginning to reap the benefits of the experience gained in the last war in which sea power played one of the most important if the not decisive rôle. This is all the more essential since, up to the present, its foundations have been rather inadequate. In a review of past history, Castex rightly characterizes as a remarkable phenomenon the fact that, in contradistinction to the literature on military science, in the historical works of former times the problems of naval strategy have been touched upon only slightly, and compared to the great length in which tactical questions have been treated, strategy has been generally neglected. Even such important works as those of the Scotch clerk of Eldin remained bound up with the fetish of geography, formations, and positions and offered extremely little material for strategic study at a time when the most brilliant works on military strategy were already in existence.

Even the works of Jomini and Clausewitz failed to act as an incentive in this connection, and the science of naval warfare, even subsequent to the Napoleonic era, was more and more confined to the treatment of purely tactical questions. More and more the details were amplified as to the form and according to which method the naval battle was to be fought; but the broader fundamental question as to the method of conducting the naval war as a whole, and the manner in which it was to be fitted into the war plan as a whole remained unanswered. In this one-sided attitude toward the naval battle, and in view of the fact that at sea there is no terrain in the sense of military strategy on which one was accustomed to base the strategic combinations, the existence of a "naval strategy" was even flatly denied. In proof of this statement, Admiral Castex quotes the following significant sentence extracted from the works of Admiral Bouet Willaumez on battles on land and at sea, published in 1855:

Strategy on land is the art of determining the decisive positions in the theater of war and the lines and general routes over which the armies must be moved to arrive at these points. * * * At sea * * * it may be said that the word "strategy," in so far as it relates to fleets, has no actual meaning, especially since the invention of the compass * * * their lines of approach follow solely the compass needle.

Therefore questions of tactics were exhaustively treated and even the new renaissance in military strategic works which followed after the war of 1870–71—(Castex names among others, Rustow, Blume, Verdy du Vernois, and above all v. d. Goltz)—did not alter the situation. This should not be understood to mean that up to the end of the ninteenth century no naval strategy existed; both good and bad naval strategy was made, but simply that no one had thought to formulate its nature scientifically and to determine its basic laws. According to Castex it was the immortal service of Mahan to bring about a change in this state of affairs. He was the first to derive a system of strategy, a philosophy of war at sea, from the examples of history. No writer before his time so clearly appreciated the meaning of sea power and its influence on history and in the title which he chose for this epoch-making work there is inherent a program and a world philosophy.

In spite of their rather indigestible form his books for a time became a sort of gospel, "to which certain younger officers constantly appealed and which they kept under their pillows. In these intellectual circles it maintained a monopoly for some time but its influence gradually diminished when other writers entered the same field." About this same time a work appeared in England under the title of "Naval Warfare," which was of almost equal fundamental importance. Its author was Admiral Colomb, whom Castex

calls the father of the naval war game. This work was further advanced by Admiral Troubridge and Admiral Custance and exerted a widespread influence in the British Navy. Not until shortly before the World War was this work superseded by the doctrines of Corbett, contained in his Principles of Maritime Strategy. Although his line of thought follows astoundingly close to the conduct of the English naval warfare during the World War, or more exactly stated, his ideas sponsored all of the operative decisions of Lord Fisher and thus exerted a decisive influence on the war at sea, Corbett, strange to say, meets with little sympathy from Castex. Supported by a thorough knowledge of sources and ancient documents, Corbett wages relentless warfare against old legends and thoughtless slogans. He overthrows all the old gods, but this iconoclast, according to Castex, is more important as a destructive critical analyst than a constructive thinker. Certainly his arguments are a bitter pill for those who formerly pinned their robust faith to the infallibility of certain strategic principles. Castex maintains, after reading Corbett's book, that he went through an intellectual if not a moral crisis. He revenges himself by characterizing Corbett as a "franc-tireur" of strategy, who has made himself into a despot by his Naval Operations—the English official history of the war at sea—by seeking in this presentation to establish and confirm his preconceived ideas, and that possibly he himself might be personally responsible for some of the fatal blunders in English naval strategy during the World War. On the other hand, even Castex is compelled to concede the exceptional service rendered by Corbett by the fact that his works led to a much-needed revision of certain previously accepted truths in naval strategy. It is of the greatest interest to follow this analysis in detail, since it reveals the entire contradiction between the continentally minded Frenchman and the Englishman who thinks in terms of continents.

Such an analysis is of particular importance for those navies whose strategy is bound to the mainland and which therefore have a different point of departure from that of the peculiarly situated English. In this connection many—and even some German writers—have remained too much under the powerful influence of the English and North American naval writers. When Castex assumes, however, that Corbett is incompatible with the "pontificate of German military doctors," in particular Clausewitz, it must be emphasized, on the other hand, that it was Corbett who first discovered the comprehensive laws of warfare as developed by the great war philosopher in their special application to naval strategy and, contrary to Mahan, was the first to make practical use of them. It was this particular circumstance which influenced the author to build up his ideas along these lines in his Seekriegslehren im Lichte

des Weltkrieges (principles of naval warfare in the light of the World War).

For the rest, the historical study of Castex, which also comprises an excellent literary history of the works on naval strategy, contains much of interest with regard to the French and Italian schools, but strange to say, the works of the German naval writers, such as Rittmeyer Stenzel and Maltzahn, are not mentioned, although the works of Caememerer Bernhardi, Falkenhausen, Freytag-Loringhoven, and Schlieffen are particularly cited. As one of the most recent works on naval strategy, the work of Bernotti, La Guerra Marittima, published in 1923, is cited. This work, according to Castex, is of importance because it deals with the most modern technical improvements, the submarine and the airplane, as well as the changes in some of the strategic principles brought about as a result—a fact which some other writers and teachers have preferred to pass over in discrete silence.

Before going on to those chapters in which Castex gives his own opinions on these matters, which to-day necessarily occupy a prominent position in every discussion on strategy, we must first obtain some insight into his general ideas on strategy. In these Castex follows more or less the general trend of thought of Mahan and Colomb, with certain variations necessitated by the peculiar situation of his own country. In this he rather too conservatively seeks to combat the problematical viewpoint of Corbett, although the latter has been confirmed more or less by the actual experiences of the last war. This possibly instinctive opposition is due largely to his desire to avoid endangering the systematic and highly theoretical structure of his work, which is nevertheless intelligently formulated and based upon a comprehensive knowledge of history.

According to Castex, strategy—for which he gives a number of well-known definitions—is nothing but the general conduct of operations, the highest art of the commander and his staff; so closely bound up with politics on the one hand and with tactics on the other that all three factors comprise an inseparable whole in which, in modern warfare, the limits blend imperceptibly into one another without sharp lines of demarkation, like the colors in the solar spectrum. In the opinion of the author, this phenomenon will become more pronounced the more actual the tactics of modern warfare extend in space and time, as a result of tremendous technical developments and particularly under the influence of the airplane and submarine, so that ultimately even the higher commanders will find themselves constantly within the sphere of these weapons and therefore constantly under the compulsion of these tactical influences. Finally, only the supreme commander, directing the conduct of the naval

war from on land, or in a very widely extended theater of war, can remain exclusively within the sphere of pure strategy. Consequently, the limits between strategy and tactics become less and less well defined. The same holds true for the relation between strategy and politics, since, if we accept Mahan's broad concept of strategy, it begins in time of peace, for instance, with the policy of naval bases, by means of which the most favorable conditions for the exercise of sea power are prepared in advance. For the German reader the work is given a piquant flavor by the French author's bitter reference to the international conferences, whose only purpose "is to unite to prevent the rise of disturbing rivals, and from the green table completely to disarm those who do not understand how to defend themselves. The Washington Conference of 1922 has opened our eyes. We know now and we should never forgive ourselves if we forgot that these disarmament conferences and other similar pacts may form part of the strategy of our rivals or our enemies."

In the further discussion, Castex also emphasizes the fact that in strategy there are certain, but not too many, fundamental principles which have survived from former times and which are independent of the tactical weapons of the age. But the great difficulty lies less in the comprehension of these few readily understood principles than in their application to the special cases. For the same reason he warns against seeking to carry over directly the principles of military strategy to naval warfare. Further, he shows for instance, that a naval war against Russia or the United States requires quite different methods from those which have proven successful in the naval operations of England against Spain, France, and Germany. He is also more inclined to consider strategy as an art rather than a science, in which the peculiarities of personality, the psychological and moral factors, or, in other words, all those factors which lie outside the realm of pure science, play the most important rôle in their application. In so far as theoretical principles are concerned, these must be established by the historic method, the principal difficulty of which lies in seeking from historical accounts the unalterable values which are valid for the present and future. For the rest Castex recommends a study of the problems of military strategy on land, more with a view toward intellectual training and for the study of methods of application than for the determination of principles, which are better learned by a study of the works of the pioneers in the field of naval strategy.

THE MEANING OF SEA POWER

That part of the work devoted to general observations is followed by a second part dealing with the problems of naval strategy, of the naval forces, in which he treats of the importance of the sea lanes

and their control. In this discussion Castex starts with the premise that, with the increasing interweaving of industrial interests of the nations, the relationships since the beginning of the nineteenth century have basically altered. He quotes some very interesting statistics to support this contention. In the year 1918 the average annual imports overseas into France amounted to 1,000,000 tons of steel, 3,500,000 tons of wheat, 30,000,000 tons of coal. The overseas transport of French troops during the World War for service in France alone exceeded 2,300,000 men. To-day the dependence of the nations on the sea lanes has, with few exceptions, become so absolute that in the future all wars will, in a certain sense, become naval wars. In many instances, however, the political control of the sea lanes becomes of even greater importance. These alone consolidate the empires which are widely scattered over the face of the globe. Never would Great Britain have been enabled to realize her dream of a "World Customs Union" and other dreams of British imperialism had the control of the overseas communications not actually been held in her hands. This observation leads the author in conclusion to pose the question: "Is it not this fact alone, is it not the fear of having England as an enemy in some complication of which she disapproves or in which she might throw her support to the enemy, which forms the true basis of the "Pax Britannica," which in former times and even to-day holds in check much greed and the lust for expansion and revenge?"

Certainly, the control of the seas would receive a rude shock in this sense, if the doctrine of the freedom of the seas should be firmly established, even though it should become accepted only in the restricted sense that in a future war the freedom of the merchant shipping of the belligerent nations should be guaranteed in the same manner as that of the neutrals. Germany was the advocate of this standpoint in 1914, and the United States has long supported this doctrine, even though after her own entrance into the war she allowed nothing further of this idea to transpire. But Castex himself leaves no doubt that, with the freedom of the seas, naval warfare would be deprived of its sharpest weapon without making the general problem of war on the seas any more humane. In any event, with the withdrawal from the international conventions ratified at the Hague Conference and with the London Declaration, with its endless list of contraband and other matters, it became possible to go to extremes in the last war beyond anything previously contemplated—a possibility brought about by the fact that ultimately there remained no neutrals whatever of any importance. In the future, conditions will be the same; that is, the seas will belong to everyone in time of peace but in time of war they will belong to the strongest power, who, in so far as his military and political power permits, will chase the enemy from the

seas as well as the shipping of all the neutrals who oppose him. Thus the saying of Richelieu holds true even to-day, "The true title to this dominion is power and not reason."

He who dominates the sea lanes in war will hold them open for his own purposes and close them to the enemy. Castex, however, opposes the tendency to overrate the importance of control of the seas, which was usual before the World War and was largely due to the influence of Mahan. Have not its effects been exaggerated? True, they are undeniable, but are they decisive? Do they offer the possibility of breaking the will of the enemy with the necessary swiftness? Naturally, for such island kingdoms as England and Japan, they become vital in a war against a superior naval power, but even the situation of Italy could never become so desperate as that of England. Against Germany and Austro-Hungary the effects of the industrial warfare were not commensurate with the expectations, even toward the end of 1916, in so far as pertains to control of the seas, since both countries possessed extensive land frontiers and still received abundant supplies of contraband through neutral countries. This situation remained unchanged until after the entrance of the United States into the war, when consideration for the up-to-then most powerful neutral ceased to be a factor. Even then the results were inadequate to bring about a quick decision. In this case conditions were more favorable than they will ever be in some future war, since, as a result of the grouping of so many nations against Germany, the blockade could also be exerted on land to supplement the shutting off of the supplies from overseas.

To attain a quick decision, therefore, the purely industrial pressure exerted through control of the seas will not always be adequate and must be supplemented by military pressure, exerted in cooperation with the corresponding military operations on land. Sea power alone leads to decisions in exceptional cases only. "The victory on land is the only true decision, since it alone brings about the possibility of occupying the enemy territory, the ultimate destruction of enemy power, and of compelling him to admit defeat." The cooperation of the army and navy is therefore the rule, and, on the basis of this essential unity in the conduct of the war, there must not only be a military and a naval strategy, but a higher strategy, "*une strategie generale*," which stands above the others and must fit them into the higher operations plan. Therefore, in the opinion of Castex, there can be no more particularizing in strategy between the army and navy than between infantry and artillery in military tactics. But, when he proceeds further that—"as in military operations, the strategy on land must be decisive and that the navy means nothing more than the artillery for the infantry, an indispensable support

necessary to permit the latter to attain its objectives"—he appears to have had a special case in mind the nature of which may be easily conjectured. In general, it would be better to hold with Corbett that it depends on the particular conditions of the war in question whether the navy shall be in the service of the army or the latter in the service of the navy. One must concede, however, that the first case will be the more frequent with continental powers.

On the other hand, it is true that the pressure of sea power may fail completely when exerted against countries whose overseas communications can be replaced by land routes, such as, for example, a large continental group whose strategic possibilities as compared with former times (those of Napoleon I) have been considerably strengthened by the great increase in the effectiveness of the trans-continental and colonial railroads, even within the last decade. Castex implies that this peculiar strategic development "has not escaped the young German of to-day in particular, who would be happy to see his country embark on a system of Russo-German politics, which to him holds out the promise of a brilliant future." As a proof of this alleged new German imperialism, he cites a lecture delivered by Spengler in 1924, and an article published by Prof. Werner Daya, The Advance to the East, published in 1919, in which a Russo-German alliance is predicted. According to Spengler, after England has been permitted to exercise her undisputed dominion during the nineteenth century as a result of her sea power, the future will belong to the possessors of the great transcontinental lines; thus the continental blockade against England may be exerted with much greater effect, and under more favorable conditions, than at the time of Napoleon I. It might be added that such ambitions may be cherished by other powers than a disarmed Germany, which would only become the objective of such a strategy. Even Castex is forced to admit that these conjectures seem exaggerated; but he recommends in any event, that the superior sea power should support itself by armies, without indicating whether these should be its own or those of allies.

Consequently, Castex considers sea power of greater importance for belligerents separated by the sea, than for those having only land frontiers between them. In the second case it is questionable whether sea power is of any importance, since the outcome of hostilities will ultimately depend upon the results of the war on land; but history has shown that, even in this case, the advantage lies with the nation capable of exercising control of the seas. Of the examples which Castex cites in support of this statement, we are primarily interested in that of the war of 1870–71. At that time, France, thanks to her control of the seas, had, in theory, the possibility of attacking the

Prussian coast. Although she had to renounce this employment of her power, owing to the desperate situation of her army on land, it had the effect of compelling Germany to hold three divisions in northern Germany, aside from the 90,000 in garrison to repel a possible invasion. On the other hand, the defensive value of this sea power was small for France, since the German Army command had no reason to attempt a landing on the French coast to reach an objective which had already been attained overland. Still, for France, the free and uninterrupted enjoyment of the sea lanes considerably lightened her task of equipping and maintaining her armies for the national defense.

In the future, however, if the war should solidify into trench warfare, then according to Castex only that nation possessing sea power will have the possible opportunity—either by threatening one wing from the seacoast, by an invasion carried out overseas, or by the importation of important supplies of munitions from overseas—of reconverting the war into a war of movement. In all such cases the possession of sea power, even for belligerents which are separated form each other by land frontiers, will become an essential condition for the attainment of the decision on land. According to Castex, this was true in the war of 1914–18. It must be conceded that this strictly continental idea, as opposed to the British and American concept of the absolute and decisive importance of sea power, as represented by Corbett and by Frothingham in the English and American histories of the naval war, is worthy of consideration. For Castex there is no doubt that England would have been unable to win the war had she alone been opposed to Germany in 1914–1918. In any case, Germany would have lost her colonies and her merchant marine, but no decision would have been reached. In the actual outcome of the struggle, it was primarily a victory of the traditional English policy, which consisted in concentrating as many allies with armies against Germany as possible. The ultimate victory is therefore presumed to be due only partially to superior sea power, and partially to better politics. Had the German politics not created such an impossible war situation, the superior power of Great Britain at sea would have rested much more lightly in the balance.

The concept of control of the seas must be considered in a relative sense. In order that it should be exerted on all seas, the combined fleets of the world would be inadequate. Thus, for instance, in the last war, the control of the seas of the western powers was successively challenged for a time by the German cruisers, while it was maintained absolutely by Germany in the Baltic, and by Turkey in the Sea of Marmora up to the end of the war. Even a decisive naval battle never ends with the complete annihilation of all the enemy ships, and still less have blockades

always been absolutely effective. In practice, however, it will suffice if the control of the seas can be exercised at the right moment and in the right place. In this sense it does not mean the control of all the lines of communication, but only those sea lanes which are most important for the purposes of the moment.

But, asks Castex, what of the concept of control of the seas in these days, in the era of the submarine, which disposes freely of all the ocean depths and is capable of moving unhindered at practically any desired level? What, in the era of the airplane, which is capable of flying unpunished over the ocean and mocking its alleged controller? In the words of the English Admiral Bacon, control of the seas has become a questionable concept to-day, while according to the American Admiral Sims, it exists for England to-day only in the old sense of the Nelson tradition; that is, on the surface of the water. In attempting to supplement this by control of the depths with submarines and control of the air with airplanes, the difficulty arises that control, in the old sense of control of the seas, does not exist. "If I possess 10 submarines and my enemy 50 submarines, that does not give him control of the seas in the depths, since his 50 boats will not hinder my 10 boats from moving freely in the depths." Still more incomplete is the control of the air, since even the nation possessing a great superiority in aircraft can not presume to control all three dimensions in the air and prevent the enemy from effecting a heavy concentration temporarily at any place for certain periods. Therefore, when we speak of control of the seas to-day, it must be with the above-mentioned limitations in mind.

The author believes also that, in consequence, France possesses adequate means for maintaining at least the most important communications with her colonies in North Africa, through the medium of aircraft and submarines, even though the normal lanes on the surface should be denied her by superior enemy countermeasures. In the last war 247,000 men were transported to France from North Africa and 134,000 men from West Africa. He is therefore of the opinion that the submarine could be considered as a means of transport to a limited extent only, although in cases of emergency, it might serve for infantry lightly equipped, or for commanders and their staffs. Aircraft are even worse for purpose of troop transport, aside from airships, which the author claims will soon be considered only as specimens of "air paleontology." Thus the transport of 2,000 men would necessitate 100 aircraft of the Dornier Superwal type. For the transportation of freight this number of aircraft would require one month to handle 2,000 tons, which is equivalent to the cargo of a small freight steamer. In spite of these great drawbacks, this type of transportation could be used when it became a question of great speed or when a lack of other facilities

makes such a means essential. On the whole, however, one is restricted to the older means of transportation with all the consequences which such employment entails with regard to control of the seas. This is, as in former times, always relative, incomplete, and limited in time and space. One should therefore revise the concept of control of the seas, in the sense that it implies guarding solely the most essential sea lanes on the surface. " The mission of the naval forces is to exercise this control and in cooperation with the military forces on shore to make the industrial and military control effective within the sphere of the conduct of the war as a whole."

THE CONDUCT OF THE OPERATIONS

The Attack on the Communications and Their Defense

In the conduct of the naval operations, the attack on the overseas communications and the defense of these sea lanes become of primary importance. But ever and again in history an effort has been made to achieve this purpose by too direct and simple means to the neglect of the rôle which must be played by " organized power " under these conditions. The cruiser warfare becomes a purpose in itself. It was through this means alone that Pontchartrin, the Minister of Marine under Louis XIV, hoped to attain the purposes of the war without resort to the expense entailed by the construction of a fleet. Finally, when Choiseul, the Minister of Marine under Louis XV, recognized at the end of the Seven Years War the weakness in the French conduct of the war and placed the orders for new warships, it was too late. It was not until the war of American Independence that an equilibrium between the French and English fleets was reestablished, and as a result the French overseas communications were afforded more adequate protection than in any previous war. " From the beginning to the end, this war shows to what extent the existence of a strong fleet, the presence and the more or less great activities of the fleet, influenced the operations relating to the attack on or the defense of the overseas communications." But this point of view was lost again at the time of the French Revolution. The Committee of Public Safety decided to return to the policy of Pontchartrin. "We have," they stated, " a single mission to fulfill * * * namely, to protect our commerce and to destroy that of our enemy * * * the English Government may, if it desires, proudly parade its fleet and maneuver it back and forth in tactical array; the French Fleet will restrict itself to attacking that which they hold most precious, their wealth. All of our plans have no other aim than to devastate their commerce, to ravage and destroy their colonies, and finally to force them to a shameful capitulation." But despite the great efforts of the French from 1793 to 1797 the cruiser warfare did not succeed in

destroying more than about 3 per cent of the English overseas commerce, a figure which hardly exceeds the normal hazards of navigation. Therefore Pitt was right in stating in 1801: "We have developed our overseas and coastal trade to a point never reached before and we may regard the current year as the most satisfactory which this country has ever experienced." The protection afforded the English ocean-borne trade had proven stronger than the attacks made upon it. History repeated itself. The fundamental error of the cruiser warfare, due entirely to the failure to appreciate the necessity for the support which must be given by organized power, the fleet, was again demonstrated. Napoleon himself never lost sight of this fact, as was definitely proven by his large shipbuilding program of 1801–1814.

Even in the war of American secession, the material damage inflicted by the cruisers of the Southern States on the commerce of their enemy was slight. However, under the moral influence of these losses the Northern States precipitately sold their ships to foreign countries, primarily to England, in order to withdraw them from these attacks. According to Castex, it was exactly this circumstance which was the cause of the peculiar disparity between the commerce of the United States and its merchant marine, which has existed almost to the present day. Of much more decisive influence on the course of the war than the cruiser warfare of the Southern States, which soon came to an end for the lack of the support of an organized fleet, was the blockade established along the enemy coast by the Northern States. Once again the battle fleet threw its weight into the balance against the influence of the commerce raiders. In this case the conditions for cruiser warfare were the most favorable possible, since the cruisers were equipped with steam propulsion, while the opposing battle fleet was composed largely of sailing vessels. The disparity could not long continue. The astonishing fact remains, however, that this in itself later became a motive for overestimating the cruiser warfare. "Certain individuals became convinced that the material progress of our age has brought to nought the experience of previous ages and that the solution of the problem must be sought anew * * * that nothing may be derived (from the experience of the past) for an epoch which has witnessed the development of steam, electricity, and rapid communications." This is a trend of thought as old as the world which is repeating itself in our times. At first this brought about the revival of the theory of cruiser warfare toward the end of the nineteenth century, under the name of the "jeune école." In the Russo-Japanese War it was demonstrated that an attack on the enemy communications is only useful when it serves as a diversion to provide better preliminary

conditions for the battle. An attack of secondary nature is only of interest when a major operation is planned to be executed simultaneously. Between the attack on the enemy lines of communication and the employment of the organized forces there is a constant reciprocal effect, which may be neglected only at the expense of the ultimate decision.

With regard to the war of 1914–1918, Castex praises us (Germany) for the fact that as excellent soldiers, well trained in the art of war by a thorough study of history, we fully appreciated what results might be obtained through commerce warfare alone. We, however, conducted an energetic cruiser warfare according to peace-time preparations, in spite of the certain conviction that it could last only a short time; that we were right in not leaving a portion of our forces unemployed and not neglecting any means of inflicting damage on the enemy. In their defense the Western Powers committed the error of remaining too much on the defensive and attempting to cover and protect everything at the same time. One particularly grave error committed by the Allies was the effort to conquer the German colonies too soon in the course of the war, which only led to a scattering of the forces. As a result the German cruisers had an easy game and the moral effects at certain moments, particularly in South America and India, were very considerable. But toward the end of 1915 even this cruiser warfare began to approach its classic end—a matter which could have been foretold by all previous experience. The fact that the allied cruisers were able to concentrate their efforts undisturbed on the chase of the German cruisers was due solely to the protection accorded from the distance by the English Fleet in the North Sea and the French Fleet in the Mediterranean. " The play of the main forces, in its invisible effect from the distance, in reality controlled the entire theater of communications." Only once was this control seriously challenged, when Graf Spee succeeded in effecting a fortunate cruiser concentration which constituted a serious threat to the divided forces of the Allies. The awakening at Coronel was painful.

It suddenly became necessary to take account of the fact that an organized force plays a considerable rôle in all of the relations between the operations in question. But one month later order was again restored with the victory at the Falkland Islands, since the Germans in their operations had neglected to establish the necessary reciprocal action between the organized force in her home waters and the force on foreign station. In this particular question Castex fully shares the standpoint of the German official historical account of the war at sea. If we compare the effects of the cruiser warfare on both sides from August 1, 1914, to December 31, 1915, it is found that during this period the Allies lost 178 steamers with a total of

488,645 British registered tons while the Central Powers lost 313 steamers with a total of 906,101 British registered tons.

This comparison becomes complete, however, only when we add to the losses of the latter the ships which were forced to lay up in neutral ports or which were blockaded. These amounted to not less than 724 steamers or a total of 2,878,533 British registered tons. The net results were therefor overwhelmingly in favor of the Allies.

From these examples we see that cruiser warfare, with which one seeks to avoid battle between the organized forces, always leads back to the battle if a decision is to be obtained. " It is simply an illusion when one hopes to conduct a victorious war by seeking to avoid the essential act of force, the battle." Only when there is a sound reciprocal relationship established between the cruiser warfare and the operations of the fleet, can one hope to obtain even a small measure of success by the first method. " Cruiser warfare, conducted within reasonable limits, may considerably support the activities, on which the main and ultimate results depend; the cruiser warfare included." " Only the belligerent who controls the seas through the superiority of his organized power is able also to dominate the overseas communications."

The Attack on the Enemy Coast and Territory and its Defense

Even more than the attack on communications, operations against the enemy coast and enemy territory have exercised an irresistible attraction on many minds in all ages, and in many instances naval warfare has been conceived solely as a coastal war as a result of mistaking the objective of the operations for the war aims, although these are not always one and the same. It is not necessary at this place to go into a description of the many attempts to solve the " eternal problem of a landing in England," which Castex gives. The failure of these efforts can be explained in every case by the mistake, also frequently made in the cruiser warfare, namely, that of neglecting to consider the main body of the enemy forces.

On the other hand in the War of American Independence the coasts of the French and Spanish allies enjoyed a certain measure of security for the first time, although they were unprotected, since the attacks on the enemy communications and territory did not permit the enemy to engage in operations against these coasts. Strange as it may seem, the importance of the concentrated fleet in all operations overseas was only fully appreciated relatively late even by Napoleon I, in spite of the unpleasant experiences he suffered in this connection in his expedition to Egypt. Trafalgar finally put a definite end to all plans for the invasion of England and thus decisively and definitely safeguarded the English coast, although the

field of battle was far from the coast of England. In the numerous naval wars conducted between 1854 and 1894, that age marking the beginning of ocean steamship traffic—Castex counts no less than 14 during this period—the importance of the battle fleets diminished somewhat in most cases because the relative strength of the combatants was unequal while in many instances only one of the belligerents possessed an organized fleet, so that the stronger was enabled to confine his efforts to direct operations against the enemy coast. The result of this and the lack of any great naval battle strengthened the erroneous conception of naval warfare as a war on the coasts. The works on naval warfare between the years 1870 and 1900 reflect this attitude very clearly. The generally prevalent anarchy in the concept of naval warfare spread still further when the "jeune école" in France started its intellectual campaign. "From this Mahan (first) and Colomb * * * appeared like lighthouses to save the situation." According to Castex it took France over 50 years to bring the ship of strategy back to her proper course.

It is not astonishing, therefore, that during the Spanish-American War the whole of the east coast of the United States feared that an attack threatened as soon as it was known that the Spanish fleet had sailed. Instead of relying upon their own fleet, the Americans hastily erected defense batteries along the shore, placed even the oldest monitors in commission, recalled the blockading squadron from Cuba to protect the coasts, and held back the troop transports bound for Cuba. The Japanese took quite a different attitude in the Russo-Japanese War in holding back only a few vessels for the protection of their coasts, in spite of the threat exercised by the Russian cruisers in Vladivostok. Contrary to the erroneous policies of other nations during this epoch, they did not employ their torpedo boats for coast defense but used them primarily for offensive operations with the fleet. During the war of 1914–1918 the Allies had a free hand to attack German territory outside the North Sea and the Baltic. Castex considers that such attacks are a mistake in that operations against these colonies were conducted from the start, before final accounts had been settled with the German cruisers in foreign waters and the High Seas Fleet. Had the Allies possessed the means to accomplish both at the same time, no objections could be raised against such procedure. With the strength relations as they existed in 1914, the aims of the operations should have been determined according to their urgency and importance with respect to the warfare as a whole. In his opinion the immediate protection of our own (German) overseas communications by the establishment of convoys should have been given primary consideration, while the attack on the bases of the German

cruisers in foreign waters (the German colonies could hardly be considered as such in this connection) might have been undertaken later, or even subordinated to other more important operations. Further, these various German bases differed from one another in relative importance. Of greatest importance was the fortified German base at Tsingtau, then came Togo as well as the other South Sea islands of Yap, Angaur, and Nauru, on account of the radio and cable stations, and, finally, the other German colonies. The sequence of the operations should have been based on the above considerations, but instead of that they were in fact primarily determined by political motives.

On the other hand, the German operations against the east coast of England were conducted under quite different conditions and with quite other operative aims. These had nothing to do with the above-mentioned undertakings; for that reason also it is not quite clear why Castex treats them together with the others in the same connection and further supposes that they were initiated in the fear of making contact with the English forces, although as a matter of fact this was the primary purpose of these undertakings. According to Castex the result of these operations (the attack on Sunderland included) was the following: "Each time it was clearly evident that the mind of the leader was heavily burdened with fear of an encounter with the English Fleet, which might fall upon him at any moment. This fear, the beginning of wisdom, caused the undertaking to be restricted to rapidly executed raids, initiated and conducted with great secrecy, lacking in any real effectiveness; this caused them to be suddenly broken off and the force speedily put about as soon as there appeared to be remote possibility of an encounter with the enemy fleet. The latter, playing the rôle of the sword of Damocles, saved the coast from any serious threat." On the other hand, the German strategy in the Baltic, strengthened by the holding back of the English Fleet, was maintained by the dispatch of large bodies from the High Seas Fleet to this undisputed area, whenever the execution of operations against the Russian and Finnish coast made such a course advisable. The Russians never took advantage of the times when the German Fleet was fully occupied in the North Sea to initiate attacks on the Baltic as was contemplated by the plan of Lord Fisher, but assigned to their fleet the sole mission of protecting the Gulf of Finland and the Russian capital.

Summarizing, all naval operations against the enemy coast from olden times down to the present day have shown in every case the decisive importance of the fleet. This organized force first permits the offensive to be undertaken and facilitates it, while at the same time it is the most important factor in the defensive. Certainly the

fleet can not prevent all enemy operations against the coast, particularly if the enemy is inclined to assume a disproportionately large risk for this purpose. For this reason certain measures for the immediate protection of the most important points on the coast are indispensable, particularly those which can not be afforded indirect protection by the fleet. In weighing these two factors we must always clearly realize what disadvantages are connected with this expensive immobile protection afforded the coast as compared with the mobile indirect protection afforded by the fleet. "Over this table of attack on the coasts and territory of the enemy and their defense, the organized force, though frequently in the background, casts its gigantic shadow. If not invited to the feast, he appears uninvited and demands a place, often in an unpleasant form for those who did not think to invite this guest or who hoped to exclude him."

FIRST EFFORT TO ESTABLISH A THEORY FOR THE CONDUCT OF OPERATIONS

With such importance attaching to the organized force, as the "ultima ratio" in the control of the sea lanes and the coastal waters, it follows that our primary efforts, both in peace and in war, should be to increase the efficiency of this force to the greatest extent and that the chief aim of all of our war operations should be to defeat the enemy main body in battle or at least to eliminate it, in such a manner that we finally achieve what is known as control of the seas. For the war on land this principle is generally accepted, and both Mahan and Colomb have confirmed it for the war at sea. The fact that other views of the matter have been held is proven by the following sentences extracted from the works of Admiral Daveluy on the war at sea: "Many naval writers fall into the error of regarding only individual cases. Some maintain it is the mission of the fleet to assure the inviolability of the coasts and to attack those of the enemy, others assure us that its rôle is to destroy the enemy commerce, while still others would sacrifice it to assure the successful outcome of an attempted invasion. Well and good. Defeat the enemy and you will obtain all these results with one blow; the safety of the coasts will be assured, and all operations may be conducted successfully which the circumstances allow." Admiral Darrieus also acknowledges this fundamental principle when he lists the blockade next to the defeat of the enemy fleet as a secondary means for aspiring control of the seas, although he gives preference to the defeat of the enemy main body. With the Italians, on the other hand, such as Secchi and Bernotti, certain qualifications are noted which divert the attention from the absolute truth of the above assertions, to the difficulties confronting the weaker sea power and point to the impossibility of such weaker power obtaining control of

the seas in this manner or of even successfully challenging it. Thus Bernotti recommends in such a case that an effort be made at least to dispute the control of the seas of the stronger power in some effective manner. In actual fact it will practically never happen that two belligerents of equal strength will have equally favorable geographical situations.

In spite of this fact, in many works on naval strategy this equality is definitely assumed as a point of departure for the subsequent considerations. Consequently, such an analysis loses much of its practical value, a fact which we in Germany have painfully experienced to our detriment. Castex also finds the general application of this fundamental principle difficult. One may be ever so convinced of its correctness, be ever so determined not to undertake other operations before the desired battle, decide to make the protection of the coast and commerce and overseas communications secondary to the primary mission, regard geographical considerations as immaterial with respect to the battle, and to push the concentration of strength to the limit; one may also preach the ruthless doctrine of "sink and destroy"—the ruthless offensive—as we all did before the experience of the year 1914; but there are many examples in history which show that some of the greatest opportunities for success have been lost through lack of determined action in this direction. According to Castex the holding back of the High Seas Fleet in the winter of 1914 belongs in this category. But, he asks, are there no objections to be raised against this principle? Does this always lead to a successful outcome at one stroke? In reality things are not quite so simple. It is not a question of individual problems, but a complex of widely varied problems. When certain theorists assume that they have constructed their hypothesis on the basis of reality we must inquire whether they have considered the reality in its entirety, Thus the "jeune ecole" considered only the four problems of strategy—the attack on the enemy coasts and communications and their defense, without taking into consideration the decisive interaction between the armed forces. The other school, on the contrary, placed the organized force in the foreground of all deliberations. Although in the theory of strategy on land certain contradictions occur, for instance, between the "doctrinaire Jomini" and the "idealist Clausewitz" there is the difference that these relate only to questions of secondary importance, while in the important question of the main objective of the operations, both writers are in full agreement. In the case of the naval strategists this contradiction is much more pronounced, because it involves these main issues, and the problem is still further complicated by the fact that in our day its complete comprehension necessitates an evaluation of the submarine and aerial warfare.

Although, in theory at least, it is clear that the first and most important aim of all the operations must be the elimination of the enemy organized force, either by battle or by paralyzing its freedom of movement, that all other undertakings must be subordinate to this main objective of the operations, and finally, that practically all of the naval forces must be concentrated with this aim in view, we come in practice to a series of objections which makes it evident at once that we can not act as we wish, since the war at sea is not an isolated act but it is an integral part of the war as a whole. Thus as Moltke says there remains of the theory nothing but "a system of expedients."

"We have," continues Castex, "determined that nothing shall be undertaken against the enemy coasts or in conjunction with our own army, either landings, combined operations, or even troop transports, until we have fully guarded against the appearance of the enemy fleet." But how frequently has it happened in history that neither the political leaders nor the army was able to wait until the navy was capable of bringing about this ideal state of affairs. For instance, had the Japanese, as firm advocates of this orthodoxy, waited before transporting their troops to the mainland until the control of the seas had been wrested from the Russian Fleet based on the fortified harbor of port Arthur, they would have chosen the best possible means to lose the war. The French Navy according to the descriptions of the author, was even more dogmatic and, as late as 1913, wished to make the safe transportation of the African troops to France dependent on the control of the seas in the Mediterranean; achieved either by battle or blockade. Thereupon the General Staff, which had absolute need of these troops for the early battles, interfered and agreed to accept the risk for the safe transport of these troops—a decision which was possibly more readily taken because it was a question of colored troops. It is interesting to read the description of this conflict between the army and navy as reported by Castex. It was much easier for England to disregard the accepted doctrine and start the transport of the British Expeditionary Force to France at once, since she could hardly be concerned with the safeguarding of such an easy area to protect as the English Channel. Had England waited until the German Fleet was defeated before dispatching these transports her army would have remained in England, as Castex says, until the armistice. Even less were the submarines allowed to interfere with the regular movements of the troop transports. Thus political and military necessities also exert their influence, frequently making the application of the pure theory impossible, and, in consequence, the corresponding series of operations based on such theory must often be abandoned.

Matters are not much different with respect to the battle for the sea lanes. Much as we may be determined to subordinate this to the struggle for the control of the seas, and much as the cruiser warfare may have failed in the past because it leaves out of consideration the organized force, in practice we may be compelled to attack the enemy overseas communications immediately, in accordance with the conduct of the war as a whole or in the interest of the general situation, even when the control of the seas is still open to dispute and the enemy fleet is in nowise restricted in its movements. In this connection the question arises as to whether, in the defense of an invasion, the troop transports or the enemy fleet should be made the principle objective of the operations. Corbett answered this question by stating that an attack on the troop transports would draw the enemy fleet at once and consequently must serve as the best means to bring about the battle. But when he is understood to say on his further analysis that the attack on the troop transports should be conducted without regard to the enemy fleet, Castex takes issue with him for the reason that "he as an Englishman belongs to a nation which, owing to the neglect of its military establishment on land, has an inordinate fear of any invasion and that in consequence he loses to some extent the power to reason clearly." Castex recommends a middle course. In his opinion cases may arise in which an attack on the enemy communications may become the most urgent problem; and in particular one certainly would not neglect an opportunity to destroy a convoy or troop transport when it is at some distance from a stronger protecting force. If, the enemy fleet should be in the vicinity and in a position to interfere, it is necessary to make the fleet and not the convoy the objective of the operations. Finally, every "line of action should be rejected which makes its goal the communications of the enemy while constantly and systematically neglecting the organized force of the enemy." This does not, however, exclude the fact that the attack on military and industrial communications may be justified from the moment hostilities are commenced and that such attacks may effectively prepare the way for the ultimate defeat of the enemy. In particular, one should not voluntarily forego the favorable opportunities offered at the commencement of hostilities in this field, in order simply to abide by the theoretical principle.

The same holds true for the commercial blockade which the belligerents possessing the necessary strength to impose will never renounce as long as this may be harmonized with the requirements for battle against the enemy fleet. For the defense of own communications similar basic princijles are valid. True, in theory we have stated that the proper course is the destruction of the enemy fleet

before one can turn to a consideration of this problem. "Better lose the communications than violate the principle. An ideal decision, but unfortunately one which is not applicable in practice." While we are following our high aims the country itself must live, and this it is able to do largely as a result of the overseas communications, some of which—Castex mentions, for instance, in the case of France the Franco-African communications—must be maintained at any cost. "The protection of these lanes must be provided for from the very first day of the hostilities without waiting for the ever-doubtful control of the seas * * * to bring the solution of the problem." Thus the problem of the attack on enemy communications and the protection of own communications may be frequently simplified by combining the two problems in those cases where the geographical requirements are favorable. Thus it was in the French-English wars (and still more so in the war of 1914) and thus it will continue to be in the future struggles of the Mediterranean powers. In every case the battle for overseas communications assumes a greater importance than in war on land on account of its tremendous universal importance for the conduct of the war although in earlier ages war on land was also concerned with similar problems. Hence the collosal and cordial combinations, based on distance, on the position and length of the lines of communication, hence the maneuvers of Napoleon against the communications in the rear and the relative frequency and decisive character of these "battles on the reversed front" and the celebrated raids of the cavalry in the War of Secession. Only at the present time has this been changed as a result of the employment of greater troop concentration, smaller areas with shortened lines of communication, and more extended fronts; but it may be that with the development of aircraft the battle for the communications in rear will play a greater rôle in the strategy on land and that this will therefore be more closely patterned after naval strategy.

In naval strategy the forces can not be concentrated in such a one-sided manner for battle against the enemy fleet as might be considered desirable in theory; the secondary problems will probably make greater demands on the forces than one might wish. Even though we may be of the opinion that an offensive against the enemy forces may afford at the same time the best indirect protection to our coast and our overseas communications, we must still take into consideration the fact that in view of the wide expanse of the theater of war a part of the enemy force may elude us and may then attack our coasts and our lines of communication. How often have squadrons and ships failed to make contact on the high seas, and even a blockade—especially the distant blockade which must necessarily be established at the present day—does not offer any security

that the enemy fleet may not appear unexpectedly off our coasts or on our shipping lanes. For this reason a part of the forces must be detached from the main body for the direct protection of the communications, and even the coasts can not be left entirely to the protection of the shore batteries and the immobile defenses. Finally, for the protection of the sea lanes in especially threatened areas, extensive operations may become necessary in which, under certain circumstances, the whole fleet must participate to open up a free passage for the convoys. For this reason, for example, the chief of the French naval staff in 1914 considered it necessary in spite of contrary instructions from his own Government, to order the African troop transports to be formed into convoys under the escort of all available naval forces to afford them direct protection against any operations of the *Goeben* and *Breslau*. Even the Moroccan transports, which were originally scheduled to sail to France via the Atlantic without escort were held back on the rumor of the appearance of the *Strasburg* and a German auxiliary cruiser in their vicinity and were finally dispatched in convoy from Casablanca via Gibraltar to Marseilles. " All of this shows clearly that the confidence placed in the indirect protection afforded in theory by the activities of the fleet in time of peace becomes very much weakened the moment the actual hostilities begin and one finds oneself face to face with realities and the risk." One is then inclined to attribute greater effectiveness to the direct protection than one would previously admit. If these facts are clearly appreciated at the start one will not be so prone to go from one extreme to the other and will not, as in this example, employ all of the forces for the direct protection of the transports without making the slightest offensive gesture—in this case, against the *Goeben* and *Breslau*. Even the English, in the opening phases of the war, went to extremes for the direct protection of their lines of communications and employed much stronger forces for this purpose than were necessary at the start.

According to Castex an equally great mistake is made in seeking to effect too great a concentration of forces exclusively for the battle. In his opinion the French Army went too far in this direction when they sacrificed prematurely the mining district in Northern France and the Briey Basin for purely military reasons. The pressure which may be exerted by the enemy through the occupation of territory necessary to the raising of vital produce for the country, may often be of greater importance than the gain or loss of important lines of communications overseas. "Does not all this make it essential that we should carefully check the principle of economy of effort and the operations plan?" But much as we must emphasize these problems of warfare, and much as we may be compelled to devote our attention at first to these " secondary problems," we should never lose sight of the

organized force of the enemy. "Let us always think of this force even though it may never show itself." Frequently enough we must be diverted by these secondary problems, but we must always take into consideration whether the means to be employed for this purpose stand in proper relation to the aims to be accomplished and we must invariably return to the principal mission as soon as the necessity for the execution of the other no longer exists.

THE METHOD OF BRINGING ABOUT THE BATTLE

With regard to the important question as to how the battle with the enemy organized force may be brought about when it is desired, Castex in full agreement with our point of view, demonstrates that up to the war of 1914–1918 the generally accepted concept was too simple and one sided. One was too much inclined to hold to the classic engagements of the sailing ships without considering, for instance, that in the English-Dutch wars both sides were equally inclined toward the offensive, the theater of war was very restricted, the enemy fleets were in direct contact as soon as they left their harbors, and this alone sufficed to bring about the series of great and bloody sea fights which were characteristic of that age. This historical tradition as well as the battles of Aboukir and Trafalgar—battles brought on after a long chase extending over great areas and ending with a decisive engagement—have given rise to this day, and especially in the British Navy, to the concept of "pursuit of the enemy until he is found" and the "shifting of our own frontiers to the enemy coast"; in short, characterizations of a ruthless offensive initiated from the very moment of the opening of hostilities. After having momentarily sunk into oblivion, this old tradition was repeated in the pursuit of the cruiser squadron of Graf Spee, but this only in a theater of war in which the freedom of action was not restricted by the presence of submarines and mines. "At last there was space—space which allowed freedom of movement. The pursuit was permissible." This led quickly to the desired goal, but in this case only as a result of the fortunate accident that the German leader voluntarily steered for the Falkland Islands; otherwise even the speed of the ships and the rapidity of communications would not have so quickly overcome the immense expanse of the ocean. But even in other navies the difficulties of bringing about a strategic contact with the enemy in order to bring him to battle have not been fully appreciated before the war of 1914. According to Castex this was particularly true of the French Navy in the period from 1905 to 1914. "To put out from the harbor, to steer a course directly toward the enemy, to bring about the engagement which was sought, these were our deepest and inmost desires. This method of procedure appeared to us the safest and most certain

and the vast majority of us who entered the war in August, 1914, were wrapped in this illusion." We may say also that these words expressed the attitude which generally prevailed in the German Navy at the same time. As enticing as this method may appear, to steer for the organized force of the enemy and pursue it until it is destroyed, simple as it may seem and much as it may appear to be founded on the natural instinct of the offensive, one can not always make use of it. Often one can not know where the enemy is to be found nor what movements he may be expected to make; one runs the risk of failing to make contact with him in the wide expanse of the theater of war. But even if these factors are known, one will not always be in a position to accept battle at any place, either because a base is lacking or the channel or other properties of our own ships will not permit us to close with the enemy. Under such circumstances one must take position where the enemy may certainly be expected and where he may be attacked by all of the forces available to us.

But this procedure, in spite of its passive appearance, is in reality an offensive built up on the geographical situation instead of upon the basis of pursuit. The enemy is not pursued but one waits in ambush. The considerations to be given the geographical situation in this form of offensive are practically the same as those which determined the course of action in previous ages, the globe has not changed and the theater of war remains the same. The distances also have not varied; simply the speed with which these distances may be traversed. Regarded from this standpoint, the theaters of war have considerably shrunken since the days of the sailing ships, particularly in this age of the airplane. Further, to-day our vessels are able to hold a direct course with extraordinary accuracy and certainty. In consequence, in view of the rapidity of present-day communications, the supervision of the theater of war "the knowledge of space and what is occuring therein," or briefly, strategic reconnaissance, has been greatly simplified. The airplane doubles the rapidity, the extent, and the safety of the reconnaissance. At first it might appear as though the first type of offensive might be very much favored in view of the resulting reduction in the relative expanse of the sea areas. But this effect is frequently nullified by the fact that the same circumstances permit the enemy to avoid our offensive and to retreat in time to his own bases. Therefore it must be left to the strategic judgment of the leader whether the "movement offensive" or the "geographic offensive"—as distinguished by Castex—is to be preferred. With regard to the stationing of our own forces in the latter case, sufficient clues may be afforded as to the probable attitude of the enemy by the points of attraction which are given initially by his strategic position and his probable war aims. Better

yet, such points of attraction may be created by our own action, either by attacks on the enemy coast or the enemy lines of communication, a procedure which we ourselves have characterized as a "strategic means of pressure" to bring about contact with the enemy. As a means to bring about a battle such an attack on the sea lanes should not take the form of cruiser warfare, but must be conducted by the concentrated organized force against some particular important line of enemy communications. Then one will hardly fail of success.

Another means consists in the reduction of own lines of communication. If the number of sea lanes necessary for conduct of the war is very great, it will not be an easy matter to make contact with the enemy on these lanes. If we deliberately reduce their number or restrict them to one very important line—Castex appears here to have in mind above all the line of African troop transports—then there is a much greater possibility of bringing the enemy to battle on this lane. In this manner the movements of the enemy are prescribed and forced to conform to a definite and predetermined direction, in which we may prepare our counteroffensive.

A particularly difficult situation arises when the enemy stubbornly refuses to leave the harbor. This problem has been repeated so frequently in the course of history and those wars in which two belligerents have been equally matched and have both sought battle, have been so rare, it seems strange in view of these examples that the fact has been so frequently overlooked that it takes two to arrive at a decision by battle. But even this case is not hopeless and Castex sees the solution of the problem in the application of pressure, either by means of an industrial blockade or the occupation of a valuable portion of the enemy territory, where necessary in conjunction with the Army. "In any event one must make the situation for the enemy who has retreated into his fortifications so unbearable that he will be compelled to attack with his fleet, in an emergency under pressure from the Government or public sentiment." One may also prepare a trap for the enemy by offering him an attractive object for attack, create the appearance that one is involved in a perilous situation, expose one's own communications or a valuable convoy to attack, and, finally, as a last possibility one may also consider conquering from the shore a base in which the enemy fleet has taken refuge (Port Arthur, Santiago de Cuba). But this method of procedure is only applicable when the military forces of the enemy on shore are greatly inferior. Such an undertaking is only justified, according to the verdict of Lord Fisher, when it leads up to a final decisive action on the seas. During the war of 1914–1918 it could not even be employed against the German bases in Flanders, let alone the German harbors proper. Only by considering the whole of Ger-

many as a gigantic fortress would one be justified in attempting to compel the fleet to put out by conquering the fortress, like Port Arthur, on a very large scale. For such a success the armies of the Allies must be granted an equal share with the English Fleet, a manner of presenting the question which appeals greatly to Castex as a Frenchman. On the other hand, all of the English plans prepared from the beginning of the war which had as their aim the occupation of the island of Borkum as a base for conducting mine operations either to definitely block the German Fleet in the harbors or compel it to put to sea to accept battle, had to be finally dropped in 1916 owing to the insurmountable difficulties. These could not be overcome as long as the German High Seas Fleet remained undefeated. On the other hand, the French author is of the opinion that against a somewhat less powerful enemy, and with the application of all imaginable auxiliary means and modern technical devices, such procedure would lead to success.

After Castex has completed the treatment of above-mentioned questions in 5 chapters of 275 pages relating to general strategic problems, he turns to the special problem of how far these have been influenced by the airplane and submarine, in chapters 6 and 7. In chapter 8 he then reviews his efforts to arrive at a theory for the conduct of operations.

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"A" Division Officer			
"B" Division Officer			
"E" Division Officer			
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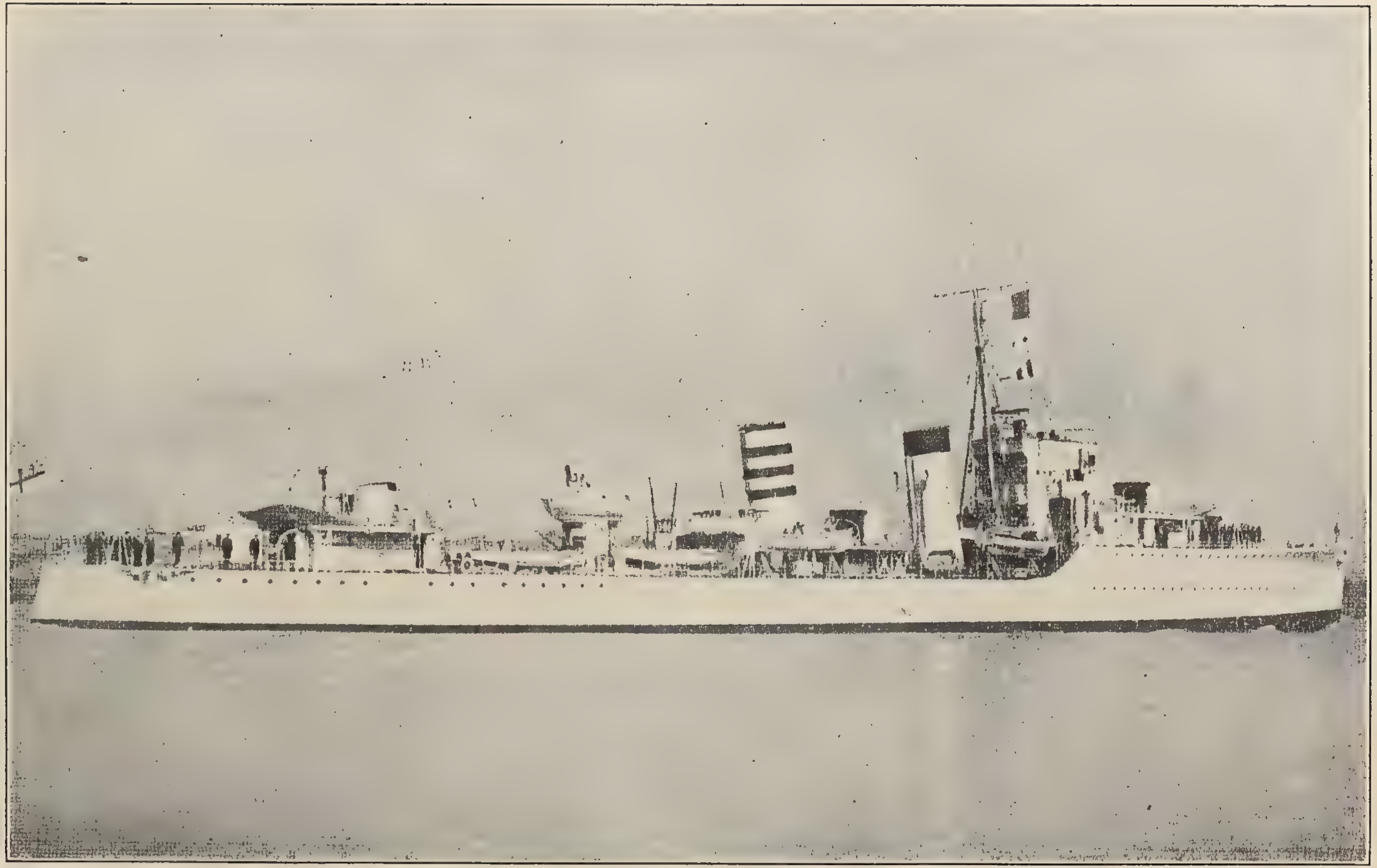

British destroyer leader *Codrington* (1,520 standard tons). Completed 1930

NEW DESTROYER LEADERS

BRITISH DESTROYER LEADER "CODRINGTON"

A visit was made on board H. M. S. *Codrington*, newly commissioned flotilla leader, at Devonport Dockyard in June, 1930, shortly before the vessel's departure for service as leader of the Third Destroyer Flotilla on Mediterranean Station.

The vessel was laid down June 20, 1928; launched August 8, 1929; commissioned June, 1930, having been built under the 1927–28 program by Messrs. Swan Hunter & Wigham Richardson at Wallsend-on-Tyne. Approximate cost, $1,550,000.

Personnel.—The ship carries a total of 12 commissioned officers (understood to be 16 for war complement), of whom five are flotilla staff officers, comprising a flotilla engineer officer, a paymaster, a torpedo officer, a gunnery officer, and a flotilla navigator. Of the remaining seven officers, six are specifically and exclusively for ship service. The commanding officer is both commanding officer of the ship and commander of the flotilla. His ship duties actually devolve largely upon the second in command, although this in no way lessons his own responsibility.

The enlisted complement is upwards of 160 (understood to be 170 for war complement).

The principal ship's data are: Length, 332 feet; beam, 33 feet 9 inches; draft, about 9 feet aft (designed 8 feet 10 inches mean at standard displacement); displacement, 1,520 tons standard (2,000 tons full load—Jane's Fighting Ships, 1929).

Battery.—Five—4.7-inch 45 caliber on centerline mounts (2 forward, en echelon in the vertical plane; 1 amidships, and 2 aft similarly en echelon in the vertical plane). Two—2-pounder pompoms (antiaircraft) on midship gun platform. Five machine guns. Eight torpedo tubes—2 quadruple, 21-inch mounts.

The battery arrangement is the standard British center line arrangement with an extreme forward gun mount on the forecastle and one superposed by some 6 to 8 feet and directly behind same with intervening blast shield; a single high mount just forward of amidships between the two smoke pipes and 20 to 25 feet above the load water line; one gun right aft on the center line, at a comparatively low elevation of about 10 feet, with the remaining mount superposed by some 8 feet, and directly forward of same (on top

of after deck house) with intervening blast shield. Equally spaced all around the gun platform are bracketed castings designed for ready stowage of 4.7-inch shells (ammunition is not fixed but separate). Abaft the midship 4.7-inch gun are two 2-pounder antiaircraft pompoms, starboard and port.

Torpedo tubes; searchlight.—There are two quadruple 21-inch torpedo tubes in tandem on center line between after smoke pipe and after deck house and separated from each other by the high searchlight platform. This carries a 24-inch or 30-inch searchlight—the only one observed, of large size—at a height of about 30 feet above water line, with windshield and spray shield for operating personnel, consisting of a basket or bowl-shaped pipe framework, canvas-covered, curving in at top and some 5 to 6 feet high above operating platform, but well clear below searchlight.

Main engines.—Consist of two sets of impulse-reaction Parsons turbines connected by flexible couplings to single reduction gears. Each engine comprises a high-pressure turbine working in series with a low pressure, in which latter the astern turbine is also incorporated. Single collar thrust bearings are fitted. The condensers are underslung to economize space. Michell thrust blocks are provided. Designed shaft-horsepower 39,000, corresponding to 35 knots (understood to have approached or reached 40 knots on full power; 38 knots for six hours).

The two sets of turbines are in a single engine room, which appears very congested and is stated to be very hot when operating at or near full power, in spite of numerous ducts arranged for both supply and exhaust ventilation—the latter arranged also to take the gland exhaust steam through special copper pipe leads terminating in or directly under the exhaust ducts. At the after end of the engine room, starboard and port, are the two main generators, turbine driven. An additional auxiliary gasoline driven generator is located well forward on the main deck (inside forecastle).

Boilers.—Three Yarrow type (working pressure 300 pounds with superheat to about 500° to 550° F.) are located in two boiler rooms, the forward room containing a single boiler with two forced draft blowers (turbine driven) hung from the main deck, the remaining two boilers facing each other in a single boiler room directly forward of the engine room, with four forced draft blowers. Reserve feet water is stored in double bottom tanks at forward end of engine room. There are no other double bottoms in the ship.

Fuel oil capacity.—Four hundred and twenty-five tons fuel oil, stowed in deep tanks forward and abaft the boiler rooms, with a comparatively small amount of additional reserve stowage for fuel oil in so-called "peace tanks," consisting of triangular structural tanks with apex down and located at or slightly below the water

line and with sides of the triangle formed by the side of the ship and main deck respectively, i. e., six tanks each about 12 feet long and of a triangular section of about 6 feet base and 8 feet depth or aggregating about 1,700 cubic feet. It was stated that it was intended to use the two tanks in the forward firerooms for fresh water, and to keep the other tanks empty except in case of special need for reserve fuel supply. It was not ascertained whether or not the disposition of these tanks was originally designed with a view to effect on stability or trim, or only for reserve fuel stowage.

Auxiliary machinery.—The anchor windlass is steam driven with a single capstan on the forecastle, the machinery located on the main deck inside the forecastle. The steering gear is the Brown Bros., of Edinburgh, electric-hydraulic gear and was stated to have given no trouble to date. On the upper platform deck forward is situated a storage-battery compartment which contains a large number of cells apparently intended for auxiliary lighting and for gun-firing circuits, etc., and also two generators for fire-control purposes as well as a small alternator for use with wireless. The fire-control plotting room was situated directly abaft this compartment, but entry was not permitted. Closely adjoining is the Sperry master gyro compass inclosure.

Gasoline stowage in bulk is provided in a tank in the bows adjoining the paint locker and adjacent to the forward crew's quarters.

Voice tubes.—Throughout the vessel, but particularly on bridge and in machinery spaces, there were noted leads of aluminum voice tubing about 3 inches in diameter, which were heavily lagged with what appeared to be hair felt and canvas. Although it was stated that this lagging was against low temperatures, and condensation of moisture in the tubes incidental thereto, it may also serve to insulate against sound interference, particularly through machinery and boiler spaces.

Quarters.—As usual in British destroyers, crews' quarters are forward and officers' quarters below decks aft, including commanding officer's quarters, which extend right across the ship. All ratings, including chief petty officers, swing in hammocks, but chief petty officers and petty officers are provided with transom mess seats. There appears also to be ample provision of aluminum lockers in crew spaces for miscellaneous stowage purposes. Hammocks are stowed in open nettings in the messing and berthing compartments, a feature which does not appear to conduce to best sanitation of these spaces. Storerooms appear ample in size and stowage space well arranged. As in the *Active*, and apparently the latest standard for destroyer types, there is a CO_2 refrigerating system, with cold-storage space of about 250 to 300 cubic feet, exclusive of machinery vestibule.

Adequate toilet facilities for the crew are provided on main (British " upper ") deck forward. Wash rooms are provided in after end of forecastle for crew, with deck and engine-room ratings to starboard and port, respectively, with galvanized-iron basins. Corresponding facilities are provided for the officer personnel on the main deck, over the officers' quarters aft, comprising one or two bathtubs and two toilets. (No shower facilities are provided for either officers or crew.)

Arrangement of bridge and forward deck houses.—The bridge is exposed except for canvas awning overhead supported on steel pipe stanchions, with a high solid plate railing about 5 feet high surmounted by an outward curving windshield extending out 8 to 10 inches from the vertical on a radius of about 8 inches. This rail completely encircles the bridge. The bridge was stated to be extremely drafty and uncomfortable.

Forward on center line is a platform raised some 2 feet above the general bridge level with the magnetic compass and steering wheel. The bridge gives a good view forward right to the stem of the vessel, but no view whatsoever aft without mounting the fire-control station, and was stated to be objectionable in this respect. There are no wings to the bridge so that visibility close alongside, abeam, and abaft the beam is very restricted and inconvenient. This is aggravated by the continuation of the high railing right aft, completely inclosing the bridge space. Several folding steps are provided at intervals along the bridge rail on both sides, to afford better access and vision.

Directly abaft and slightly above the open steering station is the fire-control station, likewise open, containing a 3-meter (estimated) Barr & Stroud range finder and other fire-control instruments.

Directly below the bridge is the inclosed pilot house, with gyro repeater compass, and auxiliary steering station, and abaft this a chart room (port) and commanding officer's sea cabin (starboard). Outboard are very small and restricted signal platforms serving two signal yards on the foremast, and appearing quite inadequate for the amount of visual signaling required for the flotilla flagship or leader. Considerable interference with their use is created by access ladders, starboard and port, from after end of forecastle deck, making the signal platforms a main (outside) passage from forecastle to bridge.

On the next lower level (forecastle deck) there are provided forward, quarters for some six or eight chief petty officers, rather cramped. Directly abaft these there is a sick bay with a single swinging berth (fore and aft) on the starboard side and the flotilla offices on the port side. Abaft the transverse passage on the same level are cabins for two officers (not yet assigned). Large Carley

(or similar) life floats are stowed on the outboard sides of lower forecastle deck house near after end.

Structural.—The *Codrington* is a raised forecastle vessel with straight stem (raked) and the flat broad "Thornycroft" stern, characteristic of all British destroyers. The deck spaces are very high throughout, and the bridge structure, particularly lofty with two inclosed deck heights of some 12 to 14 feet each, between the forecastle deck and the exposed conning and steering platform, slightly above and abaft which is the fire-control platform. The lower (forecastle) deck house extends considerably further forward than the upper, in order to form the foundation for No. 2 gun. There are two pole masts (wood) both of medium height, with the foremast somewhat higher than the main, and estimated to be 85 to 100 feet above the normal water line, with double wireless antennæ supported between the masts.

The vessel is framed on the transverse system on about a 20 to 22 inch spacing. Every fifth frame is a fairly deep frame (about 8-inch channel bar), the intervening frames being lighter (Z-bar) sections with about 4-inch web and 1½ to 2 inch flanges. A similar system is adopted for deck beams, with deep channel section beams at every fifth frame, with comparatively light angle sections in between. The main and forecastle decks are of heavy plating (estimated to be about 17.5 pounds) with lapped seams, on the "clinker" system. The shear strake appears to be about 12.5 pounds (possibly 15 pounds) and the plating below to be not more than 10 pounds. The plating of platform decks appeared very light (possibly as much as 5 pounds, but probably lighter) and was warped and springy to the tread. All bulkheads were noted to be of unusually light plating (estimated to be not more than 5 pounds), except possibly in the bottom strake, strength being secured in the main structural bulkheads by stiffeners which consist of vertical Z-bar sections at about 4 to 5 foot intervals with horizontal built-up channel section members at about 6-foot spacing. For the less important transverse partition bulkheads the horizontal stiffeners consisted of a flanging of the plating which appeared exceptionally light—as low as 2.5 pounds. For fore and aft strength deep girders are provided under the main deck built up to a depth of some 18 inches (24 inches in proximity to midship gun mount) near center line with light girders of some 6 to 8 inches depth outboard at approximately 8-foot spacing. Longitudinal girders of stringers are provided at side, spaced at about 6 to 8 feet from main deck to turn of bilge, of built-up channel section of a depth (web) of about 8 to 10 inches. As previously stated, there are no double bottoms except the reserve feed tanks at forward end of engine room. In the engine room additional strength against racking stresses is provided by channel sections of about 8 by 3 by 3 by ¼ inch carried

diagonally from the main deck fore-and-aft girder which is situated some 6 to 8 feet in from the deck edge, and carried down and outboard to a longitudinal stringer near the bottom of the sheer strake or slightly below, i. e., to a point some 6 to 8 feet below main deck edge.

On the whole, the structure appeared lighter than previous British designs. This may be due to a principle adopted in recent destroyer design by which the hull structure (decks, bulkheads, and shell plating) is divided into relatively small panels of relatively light plating, with backing or support of relatively great strength and ruggedness in the form of stiffeners, beams, girders, stringers, etc., built up where necessary for ease and fabrication or for greater strength. Thus, while the thickness of plating of *Codrington* is believed to be less than was the practice in earlier designs, it appears to have been compensated for by close spacing of girders, deep frames, etc.

The gun foundations are of rugged construction. In all cases the supports for the guns are carried down by extra heavy members through at least two deck heights, the supports for the middle gun in way of boiler spaces being carried right down to the keel by a very heavy structural pillar girder construction some 30 to 36 inches square up to a point just under the main deck where it opens out to match the larger structure of the immediate gun foundations.

Advantage is taken of the structure necessary to support the midship gun platform to incorporate in it the ventilation ducts for the forced-draft blowers in the firerooms, which may be exposed to seas or spray, being at main-deck level or slightly above, but provided with closing shutters.

The 200 tons additional displacement of the *Codrington* over that of the most recent destroyers ("A" and "B" classes) while doubtless assuring somewhat better sea-keeping qualities due to larger size, otherwise serve almost exclusively the requirements of flagship duties and increased flotilla staff; and it is noteworthy that the later flotilla leader, *Keith*, now building at the Vickers works at Barrow-in-Furness, has been reduced in size by approximately this amount, viz, 200 tons. The *Keith*, launched this month (July, 1930) is due for completion next spring. She is a twin-screw vessel, length over all 323 feet, beam 32¼ feet, and depth to upper deck of 19 feet. The propelling machinery, which is being supplied by Vickers-Armstrongs, will consist of two sets of Parsons turbines, with single reduction gearing, each set comprising one high-pressure and one low-pressure turbine, working in series, giving a total shaft horsepower of 34,000. The designed speed is 35 knots, similar to that of the *Beagle* class destroyers, with which the *Keith* is intended to work. Steam will be supplied by three Yarrow water-tube boilers, oil fired, fitted with

superheaters, and designed for a working pressure of 300 pounds per square inch, and a superheat of 200° F. The armament will consist of four 4.7-inch guns, two high angle 2-pounder pompoms, four Lewis guns, and one Vickers machine gun, with eight 21-inch torpedo tubes arranged in two quadruple mountings.

As indicative of the future trend in British destroyer and destroyer leader design, information respecting displacement details of the one leader and eight destroyers of the recently announced 1930 building program is awaited with interest.

Concurrently with the completion of the new flotilla leader *Codrington* and eight destroyers of the "A" class and with the return home of the leader *Keppel* and eight destroyers of the " W " class to reduce to reserve, the Admiralty have ordered a similar number of older units to be scrapped. This is necessary if the total tonnage is to be kept within the quota allowed under the London naval treaty. The vessels selected for disposal are the flotilla leader *Saumarez*, hitherto in reserve at Devonport and attached to the engineering college at Keyham, and the destroyers *Teazer*, *Tilbury*, *Splendid*, *Shark*, *Sparrowhawk*, *Simoon*, *Seabear*, and *Tactician*. The *Teazer* belongs to the Thornycroft " R " class and the rest to the Admiralty " S " class. All were completed in 1917–18. The *Teazer*, *Tilbury*, and *Splendid* are in service as emergency destroyers at Chatham, Portsmouth, and Gibraltar, respectively. Their places will be taken by the *Scout*, *Saladin*, and *Shamrock*, from the maintenance reserve at Rosyth. The other five destroyers have been for some time in this reserve at Rosyth.

FRENCH DESTROYER LEADER "VERDUN"

In April, 1930, a visit was made on board the French destroyer leader *Verdun*.

This vessel was laid down in March, 1927, and was placed in service in February, 1930; 2,436 standard tons displacement; length, 466 feet over all; beam, 39 feet; draft, 15¾ feet; fuel-oil capacity, approximately 500 tons; complement, 220.

Officers' quarters are located aft and are very roomy, well furnished with wood furniture, and ceiled on the sides and overhead apparently with composition board, giving a panel effect, and tastefully painted. Airports are brass castings and quite heavy in appearance.

The *weather deck* is of bare plating, painted and provided with metal treads to give a foothold. These are effective in so far as keeping on one's feet is concerned, but make unpleasant walking under ordinary conditions.

French destroyer leader *Verdun* (2,436 standard tons). Completed 1930

The *stern* is very broad, and sharply knuckled above the water line at which the vessel was floating, with buttocks rising rather sharply right aft and fitted with depth charge tracks inclined downward and aft through the stern.

The *bow* is high and flared; stockless anchors are carried close up under the forecastle deck.

Framing in way of the forward engine room and boiler room is longitudinal. Transverses run from a longitudinal oil bunker bulkhead at the ship's bilge to the center vertical keel and are spaced about 7 feet from centers; they are about 24 to 30 inches deep. Apparently there was a center vertical keel and one longitudinal girder each side about half way to the vessel's bilge. This longitudinal is very strong. Between the main longitudinals and the center vertical keel and oil bunker longitudinals, longitudinal framing is run. This consists of bulb angle shapes that vary from 5 to 7 inches in depth and are continuous through the transverse to which they are single clipped. The spacing of longitudinals is about 30 inches. It is understood that all French leader hulls are framed on the longitudinal system, are considered to be very strong structurally, and have given satisfaction in service.

The ship's officers seemed to regard the side oil bunkers as protection against gunfire.

Guns.—The five 5.5-inch guns are mounted on the center line, two forward and two aft in vertical echelon, and one immediately abaft No. 2 stack. Each gun is well shielded with protective plating roof and sides, but open at rear and bottom. This protective plating is of light construction, possibly of bullet-proof steel. There are four 1.5-inch antiaircraft guns.

Torpedoes and tubes.—Two sets of center, line, triple-mount torpedo tubes are installed, for 21.7-inch torpedoes.

Main engines.—Two sets of Parsons turbines are installed, approximately 64,000 combined shaft horsepower, twin screws and two separate machinery installations, one in each engine compartment. This vessel is said to have attained a mean speed of 40.188 knots, on four trial runs over the measured mile, and thus is one of the fastest destroyers ever built. The maximum propeller revolutions per minute is 360, that of the high pressure is 3,000, and that of the low pressure 800.

Boilers.—There are four boilers installed on center line, two in each of two boiler rooms. Each boiler has a total heating surface of 12,900 square feet (total 51,600 square feet), including superheaters. Counting from forward to aft, the boiler and engine rooms alternate in location, viz, boiler room, engine room, boiler room, engine room.

Blowers.—Four blowers are fitted for each fireroom, making two for each boiler. They take air from above the deck-house top and deliver it to the boiler fronts, the firerooms themselves not being under pressure. It is understood that 80,000 cubic meters of air per hour are furnished.

The *boiler feed* was said to be automatic, with float arrangement, and the oil feed automatic by pressure.

Generators.—There are two small Diesel lighting generators.

DIESEL ENGINEERING NOTES

(*Note: This paper gives a cross-sectional view of some developments in naval Diesel engineering, particularly as applying to submarines.*—Ed.)

SOME TRENDS IN DESIGN—SUBMARINE TYPE

Recent reports from abroad indicate that material advances in low weight, high speed Diesel engines have conducted to focus attention upon the practicability of developing this type for submarine use. Reduction in weight and space requirements may, in general, be said to have been effected through the following trends in design:

(*a*) Modernization of old or war-time designs.

(*b*) Development of high-speed, 4-cycle, single-acting types for locomotives.

(*c*) Increase in *mean effective pressures*, by supercharging the 4-cycle types.

(*d*) Change in *cyclic characteristics*, principally from single-acting 4-cycle to double-acting 2-cycle types.

Modernization of war-time designs

As a result of post-war experimentation and research, Diesel manufacturers have incorporated certain improvements in their war-time designs, some principal features of which may be briefly outlined as follows:

Solid injection has been extensively adopted for commercial types, but its adoption for submarines has been delayed owing to the requirement for a smokeless exhaust. However, it is reported that the year 1930 has already seen its adoption by the navies of two powers Spain and Russia).

Framing improvements are universal and may be said to comprise:

1. Tie rods to relieve the frame of tensile stresses and permit lightening the box casting of composite frames.

2. Elimination of box castings entirely in many cases, and using tie-rods and a skeleton framing; this type may be termed a tie-rod construction as differentiated from the composite type.

3. Improvements in metals and the extended employment of steel castings, welded forged steel, pearlitic iron, and alloy steel in frame members.

4. Light metal in stressed framing members is not so general as formerly, the trend being away from its employment, because of its uncertain properties, except for unstressed frame members.

The modernized design may be said to be typified by the M. A. N. 4-cycle engine, and by the Sulzer 900-horsepower, 2-cycle engine (air injection). The former has been adopted for Spanish submarines and the latter for Dutch submarines, both of which types are described in this paper.

The saving of weight in the modernized design is from 40 to 50 per cent of the war-time types. The elimination of air compressor saves from 10 to 15 per cent in weight.

Increased speed

In meeting demand for Diesel power for locomotives, practically all European Diesel manufacturers have entered the field and are developing engines of this type.

The following appear to incorporate the main features of the trend in Diesel locomotive design:

(*a*) *High piston speeds and revolutions.*—In many cases the present speeds are double the earlier designs. This has necessitated: (1) Lightening the reciprocating weights by using either aluminum or lighter cast-iron pistons; (2) using special I-section or thin shell connecting rods; (3) special wrist-pin bearing constructions.

Cooled pistons are not employed, and aluminum pistons have been successful only in sizes below 300 millimeters, although experiments are now in progress on larger sizes up to 430 millimeters. The limit in size of aluminum pistons and of uncooled cast-iron pistons has resulted in a maximum output of 125 horsepower per cylinder, with a total engine output of about 1,000 horsepower. Attempts to increase these figures—even were piston troubles solved—have resulted in approaching another limit, noted below.

(*b*) *Multiple valves* for the high-speed, 4-cycle engine seems to be a general trend, necessitated by high piston speeds and the consequent loss in volumetric efficiency incident to wire-drawing through insufficient exhaust valve area. The only solution at present, aside from supercharging appears to be that of valve multiplicity, with added mechanical complications, if not reduction in strength of cylinder head.

(*c*) *Framing changes* are quite common, such as:

1. Suspending the main bearings and eliminating the heavy crank case.

2. Substituting heavy water jacket with a light welded sheet casing around liner.

3. Use of roller bearings; although the use thus far is confined to smaller engines (except cam-shaft bearings), this feature undoubtedly saves space and would appear to improve torsional characteristics.

4. Direct injection is used extensively in Diesel locomotive engines in all types above approximately 60 horsepower per cylinder, and of approximately 500 horsepower per engine. However, it is known that two Diesel manufacturers, engaged in building engines of the fore-comer type in these small sizes, contemplate increasing the size of cylinders and retaining the fore comer. Firms such as Krupp, who use fore-comer injection in small sizes and who have developed and sold large-type locomotive Diesel engines, use direct injection in engines above 200 horsepower. It therefore seems to be a universal trend to use direct injection in all locomotive types of a size suitable for submarine adoption.

5. Open fuel-injection nozzles, owing to their simplicity, seem especially desirable. However, many manufacturers still employ closed automatic nozzles, especially in sizes up to 50 horsepower per cylinder. Some builders supply either open or closed types. Since the solution of the open-nozzle design appears simpler in the larger cylinder sizes, it would seem that the open-type nozzle would be especially adapted for use on submarine types.

It has been suggested that it might be a good plan to adopt a high-speed locomotive Diesel engine for experimental installation in conjunction with electric drive in some of our older submarines.

Mean effective pressure increased by supercharging

One school of Diesel engineering thought advocates supercharging the 4-cycle, single-acting type rather than increasing speed and lightening framing to obtain reduction in weight and space per horsepower. Advocates of this school claim:

(*a*) The supercharging does not increase the mean cylinder temperatures.

(*b*) The blower adds only 5–15 per cent to weight and space with a 50 per cent power increase.

(*c*) For engines normally running at reduced powers it is possible to run unsupercharged at better thermal efficiency and normal m. e. p. only using the supercharger for intermittently full power. The submarine motive power probably falls into the class of those power plants using maximum load intermittently.

(*d*) The adoption of supercharging in conjunction with Buchi turbines in large marine and stationary units has aided this school.

(*e*) Supercharging precludes difficulty with insufficient inlet valve area and consequent lowered volumetric efficiency.

The other school—opponents of supercharging—claim:

(*a*) The addition of a blower and drive is the chief objection to 2-cycle engines. Why not use 2-cycle double-acting rather than supercharge?

(*b*) It is against the trend toward simplicity. It is preferable to add cylinders rather than blowers.

(*c*) Although mean temperatures may be the same in supercharged as in unsupercharged cylinders, the end temperatures are undoubtedly greater and the heat stresses more severe.

(*d*) The limit to piston speeds in larger cylinders, dictated by insufficient valve area, is possibly aided on the inlet valve side but the gas velocity through the exhaust valve is greatly increased and excessive back pressures and valve stem troubles result unless extraordinary means are taken to avoid it.

(*e*) The problems of designing a reliable scavenging or supercharging blower which is simple and at the same time economical in weight and space, has not been entirely satisfactory. The trend in Europe is toward the attached air pump of the Rootes type rather than the heavier piston type. Electrically driven blowers are used but are considered too heavy an installation for light engines. The exhaust gas turbine has sufficient power for supercharging 4-cycle engines and offers a solution not possible in 2-cycle scavenging. It can not regain enough power from the exhaust to supply the larger scavenging demand. However, the supply of scavenging air is unquestionably a strong argument against the use of supercharging.

Outstanding advocates or supercharged 4-cycle are Krupp with a 700 horsepower, 6-cylinder, 1,500 12-cylinder V-type and a 2,500 horsepower, 20-cylinder V-type. These are all the same cylinder size, run at 600 revolutions per minute and in the small power have been sold commercially. The V-types are still in the design and experimental stage but the cylinder is similar and therefore the larger powers should be as successful as the smaller, unless the 20-cylinder V-type has torsional difficulties. Krupp uses attached plunger pumps or detached blower, motor driven.

The other advocate of supercharging 4-cycle in powers suitable for submarines is the Schweizerische Locomotiv Maschinenfabrik of Wintherthus, which is the firm employing the Buchi system of exhaust. It has commenced the manufacture of lightweight locomotive Diesels supercharged with a Buchi exhaust gas turbine. The Japanese Navy is reported as having purchased two of these.

Cyclic characteristics

The advantages of the double-acting 2-cycle engine may be stated as follows:

(*a*) Capable of weight reduction below that of other types.

(*b*) Capable of weight reduction without resort to special light construction.

(*c*) Capable of weight reduction without resorting to large increase in speed.

(*d*) Simplicity through use of open nozzles, solid injection, and 2-cycle elimination of all inlet and exhaust valves.

(*e*) Reduction of torsional vibration difficulties.

Some of the disadvantages may be enumerated:

(*a*) More head room required.

(*b*) Not as great saving in cubic volume as given by the more advanced locomotive types, although far more saving than any type in engine length per horsepower and more saving in cubic volume than is shown by the modernized war-time type.

(*c*) Difficulty with scavenging blowers already discussed briefly under supercharging. Independent motor-driven blowers are used successfully, but the desire is for attached positive displacement pumps such as the Rootes blower. One firm (Burmeister Wain) claims to have such a noiseless type developed and another (M. A. N.) is developing one, while using at present the detached electrically driven fan.

M. A. N. ENGINES FOR SPANISH SUBMARINES

It is reported that the improved type M. A. N. Diesel engine has been adopted for Spanish submarines. This engine is of 1,400 horsepower, and is similar in many respects to the bureau design, but is of higher speed with tie rods, solid injection, forged piston crowns, forged jackets, forged liners, and other improved features of design. It is probable that these engines will be delivered through the Rauschenbach works at Schaffhausen, Switzerland.

Of special interest in connection with Spanish new submarine construction is the report that the Maatschappij voor Scheeps en Werktuigbouw "Fijenoord" (ship and engine works) at Rotterdam, Holland, is building a 400-ton submarine, which is being shipped to Spain for assembly. This submarine is now in process of construction at the private shipbuilding yard of Horacio Echevarrista, at Cadiz, and all material from Holland is said to be received in Spain duty free. It is probable that two sets of M. A. N. engines now being built in the Rauschenbach works in Switzerland, mentioned above, are intended for this submarine. Although this submarine is reported as being built on private contract, the assumption is that when completed it will be purchased by the Spanish Government.

M. A. N. ENGINES FOR RUSSIA

Russia also is using the M. A. N. type Diesel engine, two engines having been delivered on order two years ago. It is also reliably reported that four engines, locomotive type, are now under contract for Russia, to be supplied by the Rauschenbach Works in Switzerland. Information from well-informed sources indicates that these engines might be intended for installation in Russian submarines building at Leningrad. These engines are of the 6-cylinder, 1,200-horsepower type, and differ from the bureau type in the following features:

(*a*) Employ soldi injection instead of air injection, with open water-cooled nozzles. Salt water leads to nozzles are of pure copper. The adoption of solid injection is said to have greatly improved torsional troubles through shortening of crank shaft and reduction of inertia moments; solid injection has also reduced fuel consumption and weight per brake-horsepower as well as having greatly simplified reversing.

(*b*) The cam shafts are of heavier construction, owing to the necessity of driving the fuel-pump cams, the cam shaft being driven by spur gears.

(*c*) Oil grooving in the bamag cone-type friction clutches.

(*d*) Pumps are of attached type. It appears that no improvements have been incorporated in the geared lubricating oil pump or the plunger water pump.

(*e*) The engines are nonreversible, which appears to indicate installation in electric drive locomotive. However, the opinion prevails that they will be installed in submarines. One of the testing engineers remarked that solid injection gave less trouble and required less attention than the old air injection with attached compressor. He also expressed the opinion that solid injection, coupled with a check on the load balance by means of pyrometer, is a great improvement over air injection.

One of these engines was recently seen in operation on the test stand. Despite the fact that the engine was new (having been run but two hours) and that it was running at almost no load (said to be the most severe test for solid injection) the exhaust showed perfect combustion.

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M. A. N. ENGINES FOR TURKEY AND YUGOSLAVIA

It is reliably reported that the M. A. N. engines installed in the two submarines built in Holland for the Turkish Navy are similar to the bureau type, except that they have eight cylinders. It has

also been ascertained that the Rauschenbach Works, in Switzerland, has delivered two sets of M. A. N., 6-cylinder, bureau type engines to Yugoslavia.

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DUTCH DIESEL NOTES

M. A. N. ENGINES FOR DUTCH SUBMARINES

Recent reports indicate that M. A. N. engines are installed in the "K" class submarines of the Dutch Navy, and that this type will also be installed in the three new boats (*K–XIV*, *K–VX*, *K–XVI*), now under construction; the engines for one boat are to be built by the Rauschenbach Fabrik, at Schaffhausen, Switzerland, while those for the remaining two boats will be constructed at Rotterdam. It is reported that these engines will contain eight cylinders, air injection type, designed to develop 1,500 horsepower at the German rating. The Rauchenbach engineers are believed to have proposed the adoption of solid injection for these engines, and that the Dutch authorities declined to change owing to the satisfactory results obtained with the engines installed in Dutch submarine *K–XIII*. It is understood that the Dutch commission at the Rauchenbach works in Switzerland is headed by the officer who served as engineer officer of submarine *K–XIII* during her world cruise. No details are at present available as to the displacement and other characteristics of the three new K-boats contracted for, but Jane (1929) states that they will be improved versions of the *K–XI* to *K–XIII* type (670/820 tons displacement). One special notable feature, however, is that (according to Jane, 1929) the three new K-boats will be equipped with eight torpedo tubes instead of six as in the *K–XI* class, and it is assumed that, following the latest trend in design in some other countries, the additional tubes will be placed in the bow—six bow tubes and two stern tubes.

It is also understood that drawings have been prepared for two additional Dutch submarines, *K–XVII* and *K–XVIII*, for which contracts are due to be let in the near future; these two boats will probably be built by the De Schelde Ship and Engine Works at Flushing, Holland, at which works Dutch submarines *O–12*, *O–13*, *O–14* (562/700 tons), are now building. Plans for submarines *K–XVII* and *K–XVIII* are said to embody a new type of hull construction as developed by this country. No information is as yet available as to what type of engines will be installed in these two latest projected boats.

SULZER ENGINES FOR DUTCH SUBMARINES

Dutch submarines *O–12*, *O–13*, *O–14*, *O–15*, now building will be equipped with Sulzer engines. The engines for the *O–12* were built at the Sulzer works at Winterthur, Switzerland, and were ready for tests in March, 1930. The engines for *O–13*, *O–14*, and *O–15*, are building at the De Schelde Ship and Engine Works at Flushing, Holland, the Sulzer licensees in that country. The hull for *O–15* is building at the "Fijenoord" works at Rotterdam, Holland, and the engines for this boat will be shipped from the De Schelde works at Flushing for installation at Rotterdam.

These engines are the latest type of Sulzer, 2-cycle, single-acting, air injection, 450 horsepower. Other characteristics follow:

Bore	13.75 inches
Weight per horsepower	28.66 lbs. (complete).
Stroke	17.29 inches. (?)
Revolutions	450 per minute.
Cylinders	6.

Scavenger blower, attached, plunger type.
Air compressor, attached.

Aluminum castings are used only in the air receivers, covers, etc. The entire frame is of cast steel of a 0.393 inch section, made by the Netherlands Steel Casting Works at Utrecht, Holland.

The *cylinder liners* are made of pearlitic iron which has been heated up in the mould and quenched, so that it is said to have a Brinell of 230 and can barely be machined.

The *piston rings* are also of pearlitic iron which has been annealed and cooled very slowly. The Brinell of the rings was stated to be 180–190.

The *piston* is in two pieces, with a cast-iron skirt and a forged steel crown secured by the same studs which are used for the wrist pin brasses.

The *wrist pin* is flat on top, is full bearing in the piston, and is fixed in the piston. This design is very new and is said to be a great improvement.

Smoke in the exhaust has been the great complaint of the Dutch Navy, and general opinion in both the operating and technical branches is reported as viewing the use of Sulzer engines in the O-boats as a serious mistake. Consequently, in these new engines every effort has been made to assure good combustion and prevent lubricating oil smoke. Sulzer has altered spray valves and combustion chamber and has designed a stuffing box for the scavenging pump which prevents lubricating oil leakage into the scavenging pump cylinder. Greatly improved exhaust and reduced lubricating oil leakage is claimed.

BRITISH DIESEL DEVELOPMENTS

Latest available information is to the effect that the engines for the newer British submarines (O, P, and R classes) are of the Vickers-Armstrong Co. type and represent improvements developed by that company and others, as well as those developed by the Admiralty following a study of the M.A.N. engines turned over to England by Germany after the armistice. Thus the development of the so-called "Admiralty design " has been brought about much in the same manner as that of our " bureau design." However, there is one exception to the analogy, namely, that the British Admiralty maintains a Diesel engine experimental laboratory at West Drayton (Admiralty engineering laboratory) where special effort is directed in heavy-oil engine research and design, including particularly the solution of metallurgical problems.

Although submarine Diesel engineering information from British sources is quite meager and guarded, it appears that the following constitute some of the main features of the engines for the P and R classes (*Parthian*, *Perseus*, *Poseidon*, *Proteus*, *Pandora*, *Phoenix*, all of 1,475/2,040 tons standard displacement, and the *Regent*, *Regulus*, *Rover*, all three launched June 11, 1930, and of 1,475/2,015 tons standard displacement) :

4-cycle	single-acting.
Cylinders	8.
Revolutions	400 to 450 per minute.
Injection	Air.
Brake horsepower	2,000 to 2,200.
Weight	38 to 40 pounds per brake horsepower.
Clutch	Vulcan hydraulic.

No form of electric drive is used in connection with the main or auxiliary Diesel installations in British O, P, or R type submarines, and present information indicates that no electric drive installations are contemplated for use in the near future.

A recent inspection of the three submarines built in England for Chile would seem to confirm the above information, although the engines for the Chilean boats contain only six cylinders.

It is reported that recent experiments have been conducted by Hadfield at Sheffield on a special steel, for use in Diesel engine manufacture, which had been subjected to 1,600° F. for a period of three weeks with no adverse effect.

An important cruise from the point of view of Diesel engine endurance began on May 24, 1930, with the departure from Portsmouth, England, for Hong Kong, via Suez, of British submarines *Odin*, *Osiris*, *Oswald*, and *Otus*, accompanied by the new submarine tender *Medway*. These vessels stopped at Malta, and later reports

show them as having departed from Port Said. The new P-boats are also slated for the China station, the submarine strength of which will ultimately be brought up to 18 of the latest type boats. Information on the engine performance of the O-boats during their cruise to China is awaited with interest, as it will probably be indicative of the state of progress in British submarine Diesel development and reliability.

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JAPANESE DIESEL NOTES

Although comparatively little detailed information is available on the engines installed in the latest Japanese submarines, it is known that Japan has made extensive use of the Sulzer type in her submarine installations, and that several of these engines have been supplied from the Sulzer works in Switzerland. It also appears that Japan is using M. A. N., 4-cycle, single-acting engines in some of her larger boats of recent design, equipped with 10 cylinders and developing around 3,000 horsepower per engine. As in the case of England and the United States following the armistice some of the German M. A. N., engines are said to have found their way to Japan. With the aid of German engineers the Japanese are said to have used these M. A. N., engines for models in building engines in their own country. The German steel castings are said to have been duplicated successfully by the Kawasaki Dockyard Co. and also by the Mitsubishi Co. It is also understood that the Japanese have experienced vibration troubles with the M. A. N., 10-cylinder engines installed in submarines, but that such troubles have been eliminated through the installation of a vibration damper, probably the Sandner type, invented by Erich Sandner, a German, who also is understood to have developed a successful vibration damper for the Junker aircraft Diesel engine.

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FRENCH DIESEL NOTES

The French Navy has installed a large number of Sulzer engines in submarines, all of the single-acting type. Recent reports indicate that double-acting types are being studied by the Sulzer Co., but that this type is not sufficiently advanced for submarine installation. The large number of German submarines turned over to France after the armistice would seem to have afforded the French excellent opportunities for studying the M. A. N. engine. The two French submarines, *Vengeur* and *Redoutable*, which recently completed the trans-Atlantic trip to Martinique and return are equipped with Sulzer engines, 5,000 combined horsepower. No information is at present available on the performance of these engines during that cruise.

It is understood that the French are also considering the adoption of the opposed piston type Diesel engine for submarines. According to a press notice the Schneider Co., at Lyons, France, have "taken up the construction of opposed piston oil engines, both of large and small types, based on the Chaleassieve design. They will be built for submarines as well as mercantile vessels." It is believed that the German Junkers Co., understood to be the owners of the opposed piston patents, have licensed the Schneider Co. to manufacture that type in France.

ITALIAN DIESEL NOTES

Diesel-engine installations for Italian submarines are manufactured principally by Fiat works at Turin, Italy, and the Franco Tosi works at Legano, Italy.

FIAT ENGINES

Fiat has developed a 2,200 horsepower engine for 1,500-ton submarines, and a 1,500 horsepower engine for the 800-ton class of boats, both of the 2-cycle, single-acting air injection type. It is understood that this company is successfully developing solid injection for their submarine engines. It is also understood that they have developed a forged steel cylinder for their small engines, and a cast-iron liner (said to be a low silicon iron with a partial pearlite structure) for the larger type. Some of the principal features of the 2,000-horsepower submarine are as follows:

This engine, known as the Fiat type Q–458, has eight cylinders, developing the normal rated power at 360 revolutions per minute. *Scavening air pump*, and *air compressor*, are directly driven from the main engine, while *lubricating oil* and *circulating pumps* are independently driven.

The *bedplate* is formed of four cast-steel pieces joined with flanges and bolts, forming at the bottom an oil sump. It carries eleven cylindrical cast-steel split main bearings shells each white metal lined. The lower shell can be removed without displacing the crank shaft, while the two shells are kept in place by a cap provided with locking pins to prevent the rotation of the shells.

The *crank shaft* is a three-piece forging—two are for the eight cylinders and one is for the scavenging pump and the air compressor. The crank shaft has holes diagonally drilled for the passage of the lubricating oil from the main bearings to the connecting rod bottom end bearings.

The *main cylinders* have cast-steel jackets, secured to the bedplate by means of flanges and bolts. Each cylinder is bolted to its neigh-

bor for the whole height, making a single block. This stiffening practice is similar to our bureau type. At the front lower part of the cylinder walls are arranged the air admission ports and at the rear the exhaust ports. These coincide with ports in the specially designed cylinder liner, which are covered and uncovered by the piston. The internal liner is made of special cast iron. It is fixed with a heavy connecting flange between the cylinder body and the cylinder cover. It is free to expand downward. Pearlite iron was tried but was not successful.

The *cylinder cover* is made of cast steel and is secured to the cylinder body by means of studs. It is easily removable. In the center of the cylinder cover is the fuel-valve seat and at each side are located the starting and relief valves. A hole is provided for the indicator cock, and there are holes for inspection and cleaning of the interior of the cylinder cover.

The *connecting rods* are made of forged steel of circular section with forked ends. They have one bottom and two top bearings. The two top bearings carry the crosshead pin. This pin has a square central part to which is secured the piston rod by means of a nut. To the ends of the crosshead pin are fixed the two crosshead slippers. Each of them slides between two guides oil cooled and secured to the bottom part of the cylinder jacket.

The *piston crown* is made of cast steel, cooled by oil circulation. A special baffle fitted to the top of the piston rod extends inside the cooling space and directs the oil circulation. The oil is conveyed to and discharged from each piston through a system of swinging tubes with joints made of material of high frictional resistance and large surface. The discharge of the oil from the pistons is visible and very accessible.

The only two valves which operate while the engine is running on fuel are the *fuel-injection valve* and the *scavening air-control* valve. They are operated from a cam shaft placed at the front of the engine and driven from the crank shaft by means of a vertical shaft and spiral gears. The scavening air-control valve could be made automatic as was done on later 1,500-horsepower similar engines.

The *scavening pump* has two cylinders arranged in tandem with two pistons on a single rod. The control of the air delivered by the pump is made by balanced slide valves.

The *air compressor* is of the 3-stage type with a single-step piston and the intermediate coolers are easily removable.

For cooling the pistons and for general lubrication two separate systems are provided. The cylinder lubrication is effected through special sight feed pumps with adjustable output. There are four inlets.

The *fuel pump* is placed near the vertical shaft; it has a separate pump for each main cylinder and is provided with a safety governor, and is controlled by the starting, stopping, and speed regulating devices.

The *maneuvering platform* is located at the flywheel end of the engine. It has the necessary devices for the following controls:

1. Starting and stopping.
2. Reversing.
3. Fuel pump output.
4. Lift of the needle of the fuel injection valve.
5. Cooling and lubricating oil pressure.
6. Admission of compressed air.

Starting and stopping of the engine is done with a hand wheel which automatically moves the various mechanisms; it is possible to run the engine on four cylinders only.

Reversing is effected by displacing the vertical shaft with a rocking lever by means of a compressed air servomotor, or by hand in case of emergency. A mechanical locking device prevents the reversing being effected while the engine is running.

TOSI ENGINES

Tosi submarine engines are built in three sizes, 4-cycle single-acting, as follows:

750-horsepower, 6-cylinder, 350 revolutions per minute.
1,500-horsepower, 6 or 8 cylinder, 350 revolutions per minute.
3,000-horsepower, 8-cylinder, 300 revolutions per minute.

This company has also developed a 2-cycle engine for large marine and central station installations.

VICKERS-M. A. N. ENGINES IN CHILEAN SUBMARINES

The three Chilean submarines (*Captain O'Brien*, *Captain Thompson*, and *Almirante Simpson*, all of 1,400/1,800 tons displacement) built in England and delivered to Chile early in 1930, are equipped with Vickers–M. A. N. engines. These three boats are very similar to the British O class, but are smaller, the British boats being of 1,475/2,030 tons standard displacement. Some of the principal characteristics of the engines installed in these three Chilean boats are reported to be as follows:

4-cycle	single-acting.
Cylinders	6.
Revolutions	400 per minute.
Critical speeds	270 to 325 revolutions per minute.
Horsepower	1,500.
Air compression	4-stage, capacity 1,800 pounds per square inch.
Main clutch	Cone type, in bath of oil, hydraulic.

They are air-starting, reversible, with sliding cam shaft similar to M. A. N. type. Circulating water pump attached. Exhaust from muffler discharges well below the surface of the water. Ten knots is reported to be 253 revolutions per minute. These boats have recently completed the trip from England to Chile, via the Panama Canal, under their own power. During the trans-Atlantic crossing (the longest leg of the trip being 13 days, from Canary Islands to Martinique), only one major engine casualty is reported, that of one defective engine cylinder; no attempt was made to renew or repair it at sea, the engine being run with the defective cylinder cut out. These boats arrived at Balboa, Canal Zone, in February, 1930.

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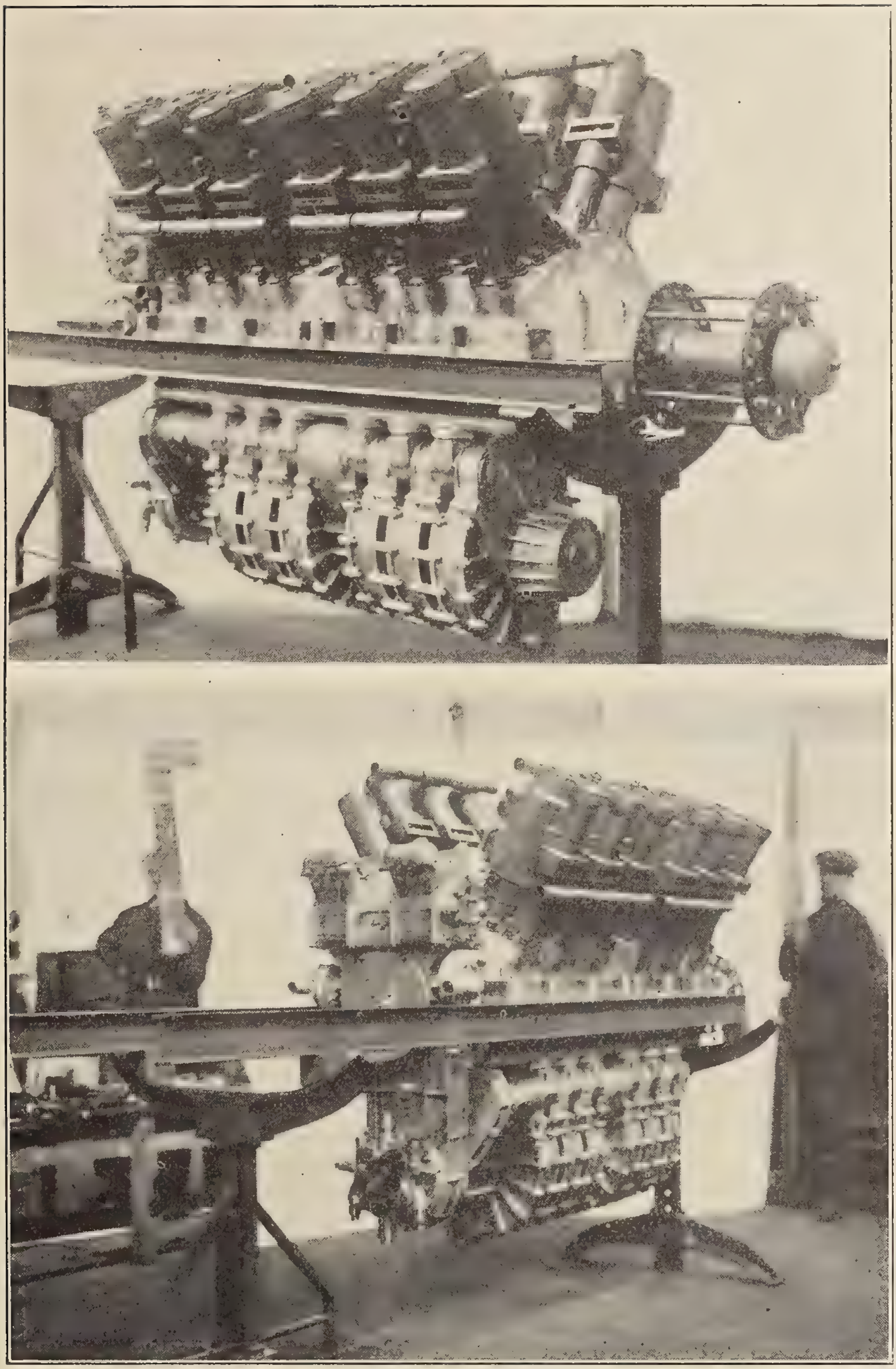
THE GATTI DIESEL AIRCRAFT ENGINE

The latest Diesel aircraft engine to make its appearance was recently exhibited at the aeronautical show at Milan Fair by the Italian firm of Alberti, and is known as the Gatti Diesel aircraft engine after its inventor. This engine, 1,000 horsepower, is a development of the 5-horsepower Diesel motorcycle engine by the same inventor. The aircraft engine consists of 12 cylinders in V-frame arrangement, 2-cycle type, and is designed to maintain constant power up to an altitude of about 16,400 feet. A few of the characteristics follow:

Bore	5.12 inches.
Stroke	7.08 inches.
Revolutions	1,800 per minute.
Compression ratio	1 to 16.
Compression	35 atmospheres.
Exhaust pressure	2 atmospheres, absolute.
Total weight (1,000 horsepower)	2,204.6 pounds.

All the principles of the motorcycle engine have been incorporated in the aircraft type. One novel feature is that of a small auxiliary cylinder, the plunger of which is driven from the main connecting rod, and acts as a supercharger and atomizing device. The auxiliary cylinder is directly connected to the attached supercharger in the bottom of the crank case. The ports in the auxiliary cylinder thus act as scavenging ports. The main piston on bottom center uncovers the exhaust ports; on return stroke these exhaust ports are covered while scavenging ports in the auxiliary cylinder are still open, thus supercharging the main cylinder. Following compression on top center, the small auxiliary plunger continues the upward stroke after the main inlet port is closed, further compressing the entrained air and driving it through the small port to the fuel nozzle, atomizing the fuel very similar to the action of spray air. This



Gatti Diesel aircraft engine (2-cycle, 1,000 horsepower)

feature appears novel, and is claimed to give the Gatti design strong patent protection.

Another outstanding feature is the full roller bearing construction throughout. There is a roller bearing in the wrist pin, and crank pin bearing also has small auxiliary rollers, which keep the main rollers separated.

The combined drive for the group fuel pumps, the two water pumps, the lubricating-oil pump, and the swash plate scavenging compressors is another feature which merits mention, the drive for all these auxiliaries consisting of spur gears and idlers operated from the main shaft.

The main pistons are aluminum, unstrutted. Fuel pump is a cam-operated plunger with sliding wedge load control. The cylinder liners are forged steel, and the piston rings of cast iron.

The total weight of engine (1,000 horsepower) is 2,204.6 pounds, or 2.204 pounds per horsepower, as against the Junker claim of 2.86 pounds per horsepower (also Packard of approximately the same as Junker) would seem to place the Gatti engine in the lightest class of Diesel aircraft engines yet developed. The lightness of this engine may be attributed to—

(1) Two-cycle operation.
(2) Supercharging.
(3) High speed.
(4) Extensive use of electron metal, aluminum, and forged steel.

It is understood that the aircraft engine which was on exhibition at the Milan Fair had been run for only a short time prior to being placed on exhibition. It is also understood that the Italian Government has purchased this engine and will begin conducting test trials at an early date .

GENERAL NAVAL NOTES

GREAT BRITAIN

NEW BRITISH WIND TUNNEL

A variable density tunnel, 50 feet long with an internal diameter of 17 feet, claimed to be the largest structure of its kind in the world, has just been completed at the Sheffield works of Messrs. John Brown & Co. (Ltd.). It is intended for erection at the National Physical Laboratory at Teddington, and is to be used for special experiments in connection with aircraft. Airship gondolas are among other things which can be put in the tunnel and tested as far as possible under actual service conditions. The tunnel is built up of four seamless, hollow, rolled-steel rings, each of which in the rolled state weighed 50 tons. These are said to be the largest seamless roller-steel rings ever produced. The hemispherical ends are made of two steel castings joined together by flanged and studded joint. The castings weighed 26 tons each. Joining of the separate sections are effected by special form of butt strap. Total weight of the structure is approximately 250 tons. It has been successfully subjected to a hydraulic test pressure of 550 pounds per square inch. It will be necessary to dismantle each section for transport by road to Teddington.

BRITISH AIRCRAFT RADIO ANTENNA

It is understood that the British no longer use a weighted fish on trailing antennæ on high-speed machines, but employ instead a series of beaded weights along the length of the antennæ, which it is claimed tend to keep the antennæ steady.

"DE HAVILLAND". SINGLE-SEAT INTERCEPTOR FIGHTER

Since publication of the July (1930) issue of the O. N. I. BULLETIN, which contained information on the Hawker *Hornet* and Fairey *Firefly* interceptor fighters, information covering another British single-seat interceptor fighter—manufactured by the De Havilland Co.—has been received. The performance of the De Havilland machine is said to compare favorably with the *Hornet* and *Firefly*, on considerably less horsepower and weight, and it is understood that the *De Havilland* has recently completed its trials at

the Royal Air Force Aeroplane and Armament Experimental Establishment at Martlesham Heath. Following are some of the reported characteristics:

The *fuselage* is of duralumin tubing belted together with wood formers.

Spars and *ribs* are of wood.

Wings and *fuselage* contain conventional fabric covering.

Undercarriage is of rubber in compression.

Ailerons are of the De Havilland patented differential control system.

Weight, 2,300 pounds, total; *span*, 22 feet, 2 inches; *length*, 24 feet, 6 inches; *height*, 7 feet, 6 inches.

Engine is the new Napier H air cooled, supercharged, 16 cylinders arranged in four blocks of four cylinders each, vertically opposed in H form. There are two crank shafts for the four blocks. Both shafts are geared to a central propellor shaft which is geared down. The engine develops about 350 horsepower and has a maximum revolutions per minute of 3,850 and normal revolutions per minute of about 3,500. Weight 620 pounds. It is understood that only a very limited number of these engines have been produced. The outstanding features of this engine, accentuated by the engine cowling, are its compactness and its small frontal area.

The following performance with fuel for one-half hour at ground and one and one-quarter hours at ceiling and interceptor equipment is said to have been obtained:

Speed	Miles per hour	Service ceiling
Ground	190	26,500 feet; climbs to 20,000 feet in 16 minutes.
Climbing	150	
At 10,000 feet	212	
At 20,000 feet	200	

NEW DEVICE FOR LANDING PLANE IN FOG

Successful tests have recently been made at Farnborough of a device which will enable pilots to land at aerodromes completely obscured by fog, with greater degree of safety than has yet been secured. These experiments carried out by the Air Ministry scientific research staff indicate considerable advance in the technique of fog landing. Formerly, most of the experiments have been carried out in clear weather by covering the pilot's cockpit with a hood and carrying an auxiliary pilot unhooded for safety. In the test made at Farnborough in June, 1930, the experiments were made in real fog which extended 90 feet above the ground, by a pilot of the

R. A. F., in a standard aeroplane, carrying one of the Air Ministry scientific research staff as a passenger.

The apparatus consisted of a small tethered sighting balloon, 400 feet above the ground and about half a mile from the aerodrome, at pitch-and-yaw indicator on the dashboard, and a weight suspended by a wire a few feet below the landing carriage of the plane, so arranged that when it touches the earth a red warning light is shown on the instrument board. The aeroplane left the ground for the first trial at 4.45 a. m., flying through fog until getting into clear air above. The pilot then made use of the known height and position of the balloon to return to the aerodrome, gliding past the balloon at an angle indicated by the instruments and landing on the surface of the aerodrome by means of the indications given by the lighting of the red lamp on the dashboard the instant the suspended weight touched the ground.

The test was entirely successful, pilot reporting no difficulty. The machine took off again and carried out an exact repetition of the first trial. This also was successful. Three further similar experiments were carried out, making, in all, five take-offs and five landings. From observations made from the top of a balloon shed at Farnborough it was noted that once the plane disappeared from view in the fog it was not seen again until after it had landed and taxied out into a clearer area near the hangars. As the experiments are further developed it may be found possible to dispense with the sighting balloon and to use radio signals, which would be heard by the pilot on passing over the prearranged point near the aerodrome.

SINGAPORE FLOATING DRY DOCK IN USE

The normal cruise (2½ years) of H. M. Aircraft-carrier *Hermes* on the China station having expired, that vessel has been ordered home to recommission. It is of special interest to note that, en route to England, this vessel is scheduled to dock in the new floating dry dock at Singapore in August, 1930. The displacement of *Hermes* is 10,850 standard tons. This dock, known as "Floating Dock No. IX," was towed in sections to Singapore in 1928. The first warship to use this dock was the cruiser *Cumberland*, on her way home from China in September, 1929.

COMMENT ON LARGE SUBMARINES

Discussing the present trend in submarine design, particularly respecting the larger types, the Naval and Military Record (London) recently contained the following comment:

There appears to be a growing uncertainty as to the value of these very large craft (submarines). Probably the one direction in which they could definitely justify themselves is as mine layers. As deep-water commerce raiders they would certainly possess the advantage of being able to vanish from sight on the appearance of any protective warship. In combatant value they are very inferior to even the smallest surface cruiser armed with guns of equivalent caliber. They have a very wide cruising endurance, but against this must be set the fact that life in a submarine at sea has its limitations, and, in the experience of many of the U-boat commanders, at the end of about a fortnight their crews were fit for little else but to get the boats back to port.

The Surcouf, the American V-boats, and our own *X–1* are all well over 300 feet in length. Radial mobility decreases rapidly in relation to length, and anything in the nature of a hurried plunge on the part of one of these very big submarines would mean courting a grave risk of descending too far and collapsing under water pressure. Probably it is not intended that the submarine cruiser should dive at all any more than she can absolutely help, but that she should function as far as possible as a surface vessel, fortified by her ability to submerge when necessary. For fleet submarine work she is out of the question because, whilst she has no more aggressive value than the small submarine, her tactical unwieldliness, her difficulty of concealment owing to the amount of water she displaces, and the big soundings she requires for attempting to dive combine to render her an embarrassing consort. She is a craft for independent action, and whether, in balance, she is superior to or even as good as the small surface cruiser is a debatable point.

Since our recent comments upon submarine cruisers, apropos of the craft of this type which France and the United States are passing into commission, has come the news that *X–1* is to be withdrawn from the Mediterranean and paid off into reserve at Chatham. Whilst this may only mean that the vessel is due for a bigger refit than Malta Dockyard is prepared to undertake, the general opinion seems to be that *X–1* will not rejoin the First Submarine Flotilla, and it is also rumored that *K–26*, the next biggest British submarine, will shortly be detached from that flotilla and brought home. The *X–1* has always been regarded as an independent unit, and the *K–26* is too big for fleet flotilla work; therefore both craft have been under the orders of the Captain (S.) for administrative reasons only. The remainder of the First Flotilla is composed of submarines of the L-class boats of rather less than half the displacement of the X and K types.

It is pretty evident that the Admiralty are not much impressed by the merits of the submarine cruiser. They have not attempted to put her to the one use to which she is best suited, and for which foreign powers employ her, namely, as a submarine mine layer. *K–26* is the survivor of a batch specially constructed to cope with the U-boat campaign and steam driven, so as to get a higher surface speed than the stage of motor development at that time would have yielded. *X–1* has always been rather mysteriously referred to as an experimental boat. Her performances have been quite satisfactory, but she is a bit of a white elephant. A squadron of such craft would form a formidable threat to an ocean-trade route, but considerably smaller submarines

are quite formidable enough in this way, and mere size is a distinct disadvantage to the underwater boat. Still, it is as well that *X-1* should have been built, since her ex stence has enabled the Admiralty to crystallize their views upon the rather nebulous ideas she represents. As a matter of fact, the proposal raised at the naval conference to restrict the size of the submarine so as to limit her capacity for mischief is sheer eyewash. The bigger the submarine the less mischief she is likely to do, because concealment becomes increasingly difficult and evolutionary mobility is heavily sacrificed (particularly in diving) in relation to growth.

BRITISH SYSTEM FOR NAMING NAVAL VESSELS

The following includes some of the more recent, as well as some long-established features of the British system for naming their naval vessels:

Battleships take the names of famous British admirals.

Cruisers (A-type) bear the names of counties.

Cruisers (B-type) bear the names of cathedral cities.

Destroyer leaders are named after admirals of less distinction than those for which battleships are named.

Destroyers perpetuate the names of celebrated old frigates.

Submarines (new boats) take their names from the classics.

Sloops and mine sweepers are named after old seaports.

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JAPAN

LAUNCHING OF 10,000-TON CRUISERS "ATAGO" AND "TAKAO"

On May 12, 1930, the cruiser *Takao* (10,000 ton) was launched at Yokosuka. The following characteristics were published by the Japanese Navy Department on the day of the launching:

Displacement	10,000 tons.
Length	630 feet.
Beam	62 feet 3½ inches.
Draft	16 feet 3 inches.
Complement	700.
Speed	33 knots.
8-inch guns	10.
Torpedo tubes	8.
Horsepower	100,000.

The following observations were made at the launching:

Bow, underwater—sharp, like our destroyers.

Eyes for paravane chains at forefoot.

Blisters amidship, approximately one-half length of ship.

Rolling keels on blister.

Flare at main deck one-third of distance from bow to stern, stated to be in wake of mounting torpedo tubes, which are to be mounted on main deck of *Takao* rather than on second deck as in case of *Nachi.*

The cruiser *Atago* (10,000 tons) was launched at the Kure Navy Yard on June 16, 1930. The press reports that, due to electric welding being used in part of her hull construction, the *Atago* has been built with 10 per cent less rivets than her sister ship the *Takao.* Both of these vessels were laid down in 1927.

FRENCH 10,000-TON LIGHT CRUISER "COLBERT"

In April, 1930, a visit was made on board the French light cruiser *Colbert*, at the naval base, Toulon, France. This vessel was laid down in 1927 and completed in September, 1929. She is a trim-looking vessel with cruiser stern and clipper bow. Her general characteristics and appearance are as given in "Jane," but it was noted that she had two boat cranes and a catapult, the latter between smokepipes. The turrets have a rangefinder on top.

Construction.—Practically no welding was seen. The decks are generally framed longitudinally. Lightened frames were in evidence. The transverses underneath the decks seem to have been cut with utter disregard to strength, in order to permit ventilation trunking of adequate size to be worked. Fuel oil is carried in the double bottom and up the sides; fuel oil capacity, 1,800 tons.

The deck is planked with teak and has a waterway like ours.

Protection.—The side belt extends from the break of the forecastle to the mainmast. This is about one-third the length of the ship. It extends to about 6 feet above the water line and seemed to be, roughly, 1½ inches in thickness outside the surface of the shell plating. The turrets have 1-inch protection. Over certain portions of the second deck some heavy deck plating (⅝ to ¾ inch in thickness) is fitted. No opportunity was afforded to see the lower decks in the way of magazines, and accordingly no details were obtained on the protection which is understood to have been worked in this vicinity.

Officers' quarters.—The furniture is partly of aluminum and partly of wood of handsome design and quite heavy. The wardrobes have roll-up doors like a roll-top desk. All the staterooms and messrooms are carefully ceiled, both on ship's side and bulkheads, as well as overhead. In the wardroom heavy upholstered furniture of wood is provided, including a buffet. The interior was decorated with new art wall paper; artificial ventilation was used and the artificial lighting was particularly attractive and of the indirect type. Generally speaking, the officers were artistically, even luxuriously, accom-

French cruiser *Colbert* (10,000 tons). Completed 1929

modated, but the crew were relatively much less satisfactorily accommodated.

Main engines.—This vessel, equipped with Rateau geared turbines, has three screws, each taking 33,000 shaft horsepower, and two spade rudders. There are no Diesel engines fitted for cruising purposes.

Machinery arrangements.—Beginning forward, there are two boiler compartments followed by an engine compartment in which two complete units are installed; then another boiler compartment followed by an engine compartment in which but one unit is installed.

Boilers.—There are six boilers, located two in each of the boiler compartments noted above. Each boiler has 12,900 square feet of heating surface, making a total of 77,500 square feet for 99,000 shaft horsepower. Both engineer officers on the vessel stated that the boilers installed easily furnished the steam for the designed shaft horsepower; in fact, it is understood from other sources that the French are particularly proud of their boiler design and manufacture, but do not feel that they have attained such a measure of success in machinery design.

Auxiliaries.—CO_2 refrigerating machinery. Steam anchor gear. Electric steering, through right and left hand screw gears, two motors for each gear, making four in all because of twin rudder installation.

Ship's power plant.—There are two turbo units, each furnishing 260 kilowatts, and two Diesel units of the Renault type, each furnishing 200 kilowatts.

ITALY

TORPEDOES OMITTED ON "FIUME" CLASS CRUISERS

It is understood that the Italian Ministry of Marine has decided to omit torpedo tubes on the 10,000-ton cruisers *Fiume*, *Zara*, and *Gorizia*. The reason assigned being that if speed, protection, and armament are to striven for in a 10,000-ton cruiser, and something has to be omitted, the most appropriate thing to omit is the torpedo.

MANUFACTURE OF OPTICAL GLASS IN ITALY

The Societa Anonima Alberto Quentin has recently begun the experimental manufacture of optical glass. The firm is an old glass establishment that manufactures plain glass, stained glass, mirrors, and a nonshatterable glass for automobiles and naval use. It is understood that all publications of the United States Bureau of Standards on optical glass are followed with great interest and that a Bureau of Standards formula for glass is being used. The

Italians are understood to regard the German optical glass made for export purposes as inferior to that made for home consumption.

⚓

GERMANY

LIFEBOAT RADIO EQUIPMENT

A description of radio equipment for lifeboats of the S. S. *Europa* follows: The apparatus consists of a teak-wood box containing a 150-watt radio transmitter, together with a 2-valve receiver, equipped with double grid valves on account of the relatively low anode potential available. The entire apparatus is most compact, to facilitate installation in restricted space.

A 24-volt, approximately 100 ampere-hour, storage battery supplies the current. Battery kept charged from ship's power plant, so that the full capacity is available in emergency. The battery is capable of an uninterrupted discharge of about 10 hours, at 10 amperes, which represent approximately the maximum transmitting load.

The alternating current for the operation of transmitter is supplied by a small transformer. All transmitter elements, such as impulsing current, variometer, extension, aerial polarity indicator, starter, etc., are installed in the transmitter.

The upper portion of the case contains the transmitter, with all operating equipment in plain view. This transmitter may be operated by the rotary transformer or by a pendulum interrupter operating independently of the transformer. This is also installed in the transmitter and feeds the latter direct from the battery. This last system of operation is merely for emergencies in case of failure of the rotary transformer. The transmitter is set to the 600-meter SOS wave length only.

The lower part of the case contains the receiver. This latter instrument, like the transmitter, obtains heated filament voltage and discharge voltage from the 24-volt battery. This instrument has a back-coupled valve detector with an amplification stage and employs double grid valves. The receiving wave length is distributed between two coils, one with a radius of 300 to 600 meters, the other of 600 to 1,100 meters.

The lower right-hand portion of the box is for the Morse key, a rheostat, and the second receiving coil. There is also space here for an ear phone and for writing material as well as for spare tubes. The top of the box serves as writing desk. There is a light on the upper part of the box also fed from the battery. The reliable radius of such an instrument may be estimated at about 50 to 60 nautical miles.

In lifeboat the antennæ are led over two folding masts and extended forward and aft in order to secure maximum efficiency with such low aerial and short distance between masts. The antennæ usually consists of two wires hung from small yards, with proper insulators. The apparatus, complete with battery and emergency transformer, weighs about 350 pounds. This apparatus is manufactured by the Debeg Co. of Berlin, Germany.

GERMAN SUBMARINE OPERATIONS

By Capt. Gustave Luppe, German Navy, retired

I

HOW THE U-BOAT CAMPAIGN WAS BORN

The greatest man in Germany—Admiral von Tirpitz—died a few days ago. It was the end of the tragic career of an embittered man.

If he had been dictator of the German Republic in 1914 we would have undoubtedly achieved victory in the World War. As it was, his brilliant plans for conquest proved in the end the first cause of our defeat.

The death of that great man releases me from a self-imposed silence. While he lived my loyalty to my chief sealed my lips.

He had suffered too much at the hands of the Emperor, the weak, frightened politicians, the obstinate superiority of the military commanders, for me, a naval officer, to add further sorrows to his old age by telling the story of his failure.

I use the word "failure," a harsh word, and yet it is true. Admiral von Tirpitz had built up the most effective naval unit in the world, but it was never used as he had planned—that was his failure.

I remember him distinctly when I first joined the Chinese squadron of the German Navy in 1897. He was in command at that time, a sailor with a great imperial vision. He was stern, ruthless, rude—an iron man with one purpose.

He wanted an overseas empire for Germany and a navy to guard it. He knew the one obstacle—the British Navy—and he schemed and planned to hold it in check.

"England must have many navies," he said to me when I was A. D. C. on board *Irene* at Manila. "There is one in the Mediterranean, one in the Atlantic, and another in the Pacific. We want only one."

When he was made secretary of the navy in the next year, he started at once to carry out this idea. The admiralty wished to fortify the island of Heligoland and the mouths of the German rivers.

"It is waste of time and money," was his advice. "We are building for an offensive, not a defensive. Germany is not preparing to protect her shores. She is getting ready to extend her empire."

He was directing his naval genius at England. He reorganized the German High Seas Fleet.

His idea was to maintain all classes of ships so that they operated as one single fighting unit. No improvements were made in new designs which rendered older men-of-war ineffective in the fighting line.

He built scores of destroyers; he called them "black cavalry." He trained them to fight like hussars.

He had been an officer in the torpedo boat division himself, and it was this experience that was most valuable to him when he launched his great U-boat campaign in 1915.

Years before the war broke out Admiral von Tirpitz was fighting imaginary sea battles with the English Fleet.

"France," he said, "is of no matter on the seas. We shall never have to fight a French Fleet. Japan is imitative—a clever nation, but not threatening our sea power. Italy is weak and America inexperienced in the arts of naval warfare.

"It is only England for which we must prepare and we must strike first and strike hard. She alone stands in our way."

ARMY'S VETO

Army commanders told Von Tirpitz that England was not a military nation. France would show strong resistance, but Germany was ready, and would sweep through that country.

"I am not a military man," Tirpitz replied, "but I do know that if you get to Paris, if you go through to the south of France, you will still have to face England. I am ready to meet her at sea."

War was declared, and Admiral von Tirpitz pressed hard for an immediate naval offensive. Every gun, every rivet in every battleship, every officer, and every naval rating was prepared.

The army, certain of success, opposed his plan, and won over the support of the politicians.

"When the winter comes the leaves will fall, and so will France," military commanders said. "If the navy goes to battle it leaves our sea front unprotected. We have prepared for 30 years to fight this war on two fronts—Russia and France. It is for you to guard the third front, our seaboard, so that we do not fight on German soil."

The army looked on it as a continental war. Von Tirpitz, who knew the reason for the war, who saw the German Empire blocked on every hand by Great Britain, knew it was a world war, unless England was defeated at once.

The Emperor was undecided, the majority supported the army view, the Emperor agreed—so von Tirpitz lost.

That was his first defeat. His policy of offensive was wrecked. The fleet was useless, and lay idle in the German Ocean in the shelter of Heligoland, with unrest, then sedition, then revolution creeping into the hearts of the crews.

"You will not be able to hold our navy," he warned the imperial cabinet in 1915. "The force of morale is the greatest force in war, and you are destroying it at home and creating it among our enemies."

He was right. By 1918 the German Navy was utterly demoralized, the officers were helpless, the sailors were cowards.

I lived myself to see the crew of the great battleship which I was commanding in the last two months of the war, when the U-boat campaign had been abandoned, refuse my orders. Stokers, armed to the teeth, held me up at the point of their rifles in my own saloon.

The last blow came when I surrendered the first batch of submarines, 24 of our glorious U-boats, to the British Navy and locked myself in my cabin to live out the disgrace in solitary agony.

But of that I shall tell later. For the time being I must tell how Von Tirpitz fought his second battle with a wavering Emperor, jealous politicians, and wooden-headed military commanders.

The military advance into France was checked, our great army machine was stopped, and England and her Empire, the Empire of which Von Tirpitz had warned the Emperor, stood beside France, equal in military determination and efficiency.

"Now," said Von Tirpitz to me, "it is a world war of many years."

The sinking of the *Cressy*, the *Aboukir*, and the *Hogue* by Commander Otto Weddingen in *U–9* on the morning of September 22, 1914, revealed to the German command for the first time the startling possibilities of the U-boat as an offensive weapon.

When war was declared the German Navy possessed only 21 submarines, with 9 under construction. They were an unknown weapon in an experimental stage. They were looked on as purely defensive—to keep the enemy off our coast.

All the training schools for the submarine service had been disbanded at the outbreak of war, and the cadets went into the battle fleet to take part in the great naval engagement which we thought would take place. These schools were reopened at once and an intensive training of men for the submarine service began. Orders were given for the construction of additional U-boats.

The personnel of this new arm of the fleet was chosen from the crews of torpedo boat destroyers. Exceptionally high standards of morale were required.

The officers must be of great strength of character and personality. They must be practical seamen, excellent navigators, skilled elec-

tricians, and torpedo experts—brave, fearless men of unusual ability and power.

SUBMARINE COMMAND

A central command of this new service was formed, and I was placed in charge of the First Torpedo Division at Kiel.

Von Tirpitz came to Kiel to supervise personally the development of the submarine service, and he worked with us day and night.

The problems we encountered can not be known by any other nation to-day, except perhaps, England. When we began to explore the possibilities of the science of the underwater boat we realized how much we had neglected in that branch of our navy.

And we found out as well that to operate a submarine service against the world, as we were forced to do eventually, required the assistance of our entire fleet, a discovery which few nations to-day realize when they talk of using the submarine as an offensive weapon.

Submarines were being built in five dockyards in different parts of Germany. The pressure of the blockade was not felt as yet, and we had plenty of material.

II

The first two years of our U-boat campaign met with unqualified success. Our losses were small and the damage we inflicted on the English was tremendous.

The submarine was terrifying England. We were amazed to find that we could strike so deeply at the hearts of our enemies with such small weapons and with so few of them.

Why, in February, 1915, we had only 27 submarines in service. Only one-third of these were ever on active service at one time. This same ratio applied to the service throughout the whole of the war.

In 1917 we possessed a fleet of about 300 U-boats, but there were never quite a hundred ready for sea. But in those days our successes were dwindling rapidly, the dangers were increasing proportionately, and the death toll was mounting terribly each day.

When the war was over and we submitted the list of our submarine strength to the British Admiralty they would not believe us. We had approximately only 125 U-boats to hand over, although we were building 440 new submarines of various types.

It was too late then. During the last two years of the war that was all we heard at Kiel—" too late." But I must deal now with 1915 and 1916.

For the first two months our U-boats confined their attention to men-of-war. None of us realized—Von Tirpitz included—the effect the British blockade would have.

Our troops were marching victoriously into France. We had plenty of gold, men, and materials. But by Christmas all this had changed, and in February, 1915, it was decided to attack enemy merchantmen, and the submarine zone was declared.

There was nothing to hinder us from smashing the British blockade but the indecision of the imperial cabinet. Von Tirpitz urged them to begin an unlimited building program and launch an unrestricted U-boat warfare.

"They are starving us—suffocating the nation—undernourishing the mothers and killing infants," he argued. "Our reply is the submarine. Let us use it with all the ingenuity and force at our command."

The time was ripe. The English had laid mines on the fringe of the North Sea, but they were a joke.

They were poorly constructed and faulty. They were badly laid, and at low tide they would appear on the surface and we would fire them off by shooting at them with rifles.

This discovery annoyed Von Tirpitz particularly.

"If this is a sample of the condition of the English Fleet," he said heatedly, "what fools we are not to strike at them now before they can prepare."

There was no antisubmarine campaign at that time. There could not be, for the English knew little of U-boats and had not yet discovered a means of combating them.

When lives were lost at sea through the activities of the submarine they simply lifted their hands in horror and appealed to the rest of the "civilized world" to witness this "barbarous form of warfare."

"If these people," said Von Tirpitz, "will insist on coming into the theater of war as passengers on vessels carrying contraband, then they can not blame us if they lose their lives. It would be the same if they marched through no man's land."

Our opportunity was here. We should have ignored the notes of neutral countries. After all, no country could be neutral in the great war. They must either side with us or with England, and most of them accepted England's orders.

Von Tirpitz lost this—his second—fight with the high command. The imperial cabinet listened to the neutral voices, and, by issuing impossible regulations to our U-boat commanders, succeeded, without the slightest advantage to themselves or to the nation at large, in making it almost useless for our submarines to go to sea.

Our U-boat crews were trained in the schools at Kiel, and by extensive maneuvers in the Baltic Sea.

We dismantled old battleships and used them in the submarine maneuvers. They would steam at full speed during torpedo ex-

ercise, and the accuracy of the aim of our commanders was the result of this intensive training.

CONVOY SYSTEM

After 1917, when the convoy system had been introduced by the Entente with escorting destroyers and a "zig-zag" method of steering, we copied this system in our training.

The men enjoyed this, and Von Turpitz, quick to see that here at least he could check some of the unrest among the fleet, carried this active training as far as possible.

The perils of the under-water service lay right on our own doorstep. British submarines were always lurking just outside the British mine girdle, and all navigation between Heligoland and the open sea took place on the darkest nights and without any lights.

Yet these dangers, although manifest in the early part of the war, were insignificant compared with the snares, decoys, submarine detection apparatus, nets, and submarine bombs which almost destroyed our U-boat service towards the end.

We tackled these problems as they came along with tremendous energy and enthusiasm. Our enemies at home, however, we were powerless to meet.

When the commander of the *UB–29* returned after torpedoing the *Sussex* (a British steamer torpedoed in the Channel in 1916, with the loss of 50 lives) the politicians were agog. He was asked for an explanation.

"She looked like a troopship," he told me, "and I saw British soldiers on deck through my periscope. It is all very well to say that I could come to the surface and make certain, but once I emerge I am at the mercy of the smallest gun on deck. So I released one torpedo and went away."

Von Tirpitz was pleased, and supported his officer, but the uproar in the cabinet was deafening, and this brave U-boat captain, who was only carrying out his duty to the best of his ability, had to bear the brunt of their withering fire of criticism.

"Whatever we do is wrong," became a byword among the submarine officers. It is a wonder that they preserved calm determination and loyalty right up to the end.

ALLIED LOSSES

But we went on, and in spite of this the allied tonnage that was sunk each month grew and grew, and we knew that if we were allowed to go on our campaign would be successful.

At the end of October, 1914, *U–19*, which had been ordered to Zeebrugge, left Heligoland, and started its cruise down the Channel.

At one point the submarine actually bumped and ran parallel for some minutes with H. M. S. *Badger*, a British destroyer.

It was an illustration that even then, three months after the outbreak of war, the British Navy still knew little about the submarine. The commander, as soon as he saw what had happened, dived and disappeared before the officer in charge of the destroyer had realized the situation.

U–19 was the only U-boat which survived the entire war. It made cruise after cruise.

Each time it left we were certain that it would never return, and then back it came. It was eventually delivered to the British fleet in the surrender.

LUCKY U–19

On one trip alone into the Irish Sea *U–19* sank 36,000 tons of British shipping at the close of 1916. This U-boat would have been a lucky " bag " for the commander of the destroyer if he had known anything about submarines.

We had many a laugh about " lucky *U–19* " at Kiel, and many a toast to the commander of H. M. S. *Badger* in the submarine officers' mess at Emden.

Grand Admiral von Tirpitz was superbly busy in those days. All the enthusiasm he had poured into the high seas fleet before the war was concentrated on the submarine service now. He was perfectly happy when left alone; the dark moments came when he met with interference and weakness in the imperial cabinet.

His construction program was going ahead rapidly in the shipyards. One hundred petrol engines which were being built for motor patrol boats for a foreign navy before August, 1914, were rapidly converted for use in 30 small submarines. A table of our progress shows how construction went ahead during the first two years.

The figures in February, 1915, were:

U-boats in service:
- 26 large boats (750 tons, for general warfare).
- 1 small boat (250 tons, for home waters).

Building:
- 42 large boats.
- 127 small boats.

The figures in March, 1916, were:

U-boats in service:
- 25 large boats.
- 43 small boats.

Ready for service:
- 52 large boats.
- 89 small boats.

From the early part of 1915 until the end of 1916 10 new U-boats were put into commission every month. We planned by November, 1919, to put 30 new submarines into service every month. But our program never matured—we were too late.

It was the weakness of our government's attitude to the United States that spelled defeat for us. We should have paid no attention to their protests, told America to mind her own business, and gone ahead with our U-boat plan.

Our system of releasing submarines from Heligoland and getting them out to sea had been perfected. It was elaborate but successful, and during the whole of the war—although later we were obliged to extend our precautions—we never lost one U-boat getting her "out-of-doors," as we said, beyond the British mine girdle about our home waters.

The casualties in our minesweepers, however, were terrific. We lost 165 of these vessels and thousands of men who sacrificed their lives for the U-boat service.

One morning I was with them on patrol. I was in a battleship following at some distance behind the minesweepers.

Five brand-new vessels—all the trawlers we had requisitioned had been lost—were working in V formation.

The first one blew up and sank. The second followed almost immediately. The third and fourth threw rafts and lifebelts to the crews and sank themselves five minutes later. The fifth vanished soon afterwards.

Five vessels and about 150 men—only 18 were saved—were sacrificed for one submarine. This was toward the latter part of the war. After the sinking of the *Cressy*, the *Aboukir*, and the *Hogue*, it was laid down that rescues were not to be undertaken in dangerous areas. So we stood by and saw most of them drown. The men who were saved drifted toward us on a raft.

LUSITANIA'S FATE

The morale, however, was excellent. The sinking of the *Lusitania* in May, 1915, had given an impetus to our work that even to-day it is difficult to estimate.

One small torpedo had done more to bolster up the spirits of the nation and demoralize our enemies than any one single success on land or sea.

III

No one act in the U-boat warfare created such an uproar as the sinking of the *Lusitania* in 1915. It was, and will remain in future centuries, an historic event.

The giant Cunarder was torpedoed by Captain Schwieger, in command of the *U–20*, shortly after 2 o'clock on the afternoon of May 7. Captain Schweiger was back in Germany within a few days.

"Shame," said Admiral von Muller, one of the senior A. D. C.'s to the Emperor and chief of the naval cabinet, to this gallant U-boat commander. "I have nothing but contempt for you."

No submarine captain has suffered the pain that was inflicted on Captain Schweiger for this great achievement. Yet, before long, he was decorated with L'Ordre pour le Mérite and became a German national hero.

It is best at this juncture to tell of the viewpoint of the German U-boat command with regard to ships of the *Lusitania* class.

Our spies had informed the intelligence department that toward the end of 1914 a number of English passenger vessels of large tonnage and high speed had been refitted in dockyards as armored cruisers.

A list of ships was issued to the U-boat commanders with orders to "sink without trace." The *Lusitania* was one of these vessels.

We were told that the *Lusitania* carried considerable armaments. We were told that she carried gun crews and officers of the British Navy. We had received information as well that on each trip she made between America and England she carried large quantities of ammunition and contraband materials, and we advised our ambassador to America, Count von Bernstoff, to warn the American people against traveling in that ship. All of our submarines were on the lookout for these armored cruisers. They had speed far beyond that of our submarines, and we considered it a great piece of fortune if one of our U-boats even sighted one of them, much less scored a hit with a torpedo.

The *U–20*, under the command of Captain Schweiger, left Emdem, the headquarters of the submarine service, on April 13, 1915. She went to Heligoland for her trials, and a few days later was escorted through the German and English minefields by minesweepers, small cruisers, destroyers, and battleships, and set a course north of Scotland.

Captain Schweiger carried the routine orders which were given to all U-boats, and he told me afterwards that he never even thought that he would encounter the *Lusitania* on this cruise. As a matter of fact, he did not know that he had sunk this vessel until he had returned to Germany.

The *U–20* cruised in the vicinity of Scottish, Irish, and English waters for nearly a month, sinking several thousands tons of shipping, before the open Atlantic was reached.

"It was just after lunch on May 7," he told me, "and I was on deck having a smoke as we cruised on the surface. It was very fine, clear weather. We were due south of Old Head of Kinsale. I saw a collection of masts and funnels on the horizon, and I thought at first that it was a flotilla of destroyers steaming in line.

"As we drew nearer I found that it belonged to one vessel, but I did not know what ship she was. I did not know it was the *Lusitania*.

"I went below, and we dived. When we got in range I fired one torpedo. The decks of the liner, I could see through my periscope, were deserted. She was steaming slowly."

Captain Schwieger said that almost immediately after his torpedo struck, swarms of passengers appeared on deck. There was a tremendous commotion on board the ship.

"I did not know whether I had holed her properly," he added, "but I did not fire a second torpedo to make certain that the vessel would sink. I knew from the excitement on board and the frantic groups that collected at the boat stations that the first torpedo had probably done its work. But I could not bring myself to fire a second time. I could see the scenes of terror through my periscope, so I decided to dive, and did so without discovering the name of the ship, although fairly certain that it was one of the armored-cruiser class."

Captain Schwieger then dived to a depth of 20 meters, steamed out of the area, and came home.

I know how Britain looked upon the sinking of the *Lusitania*, and all Germany knows that there was terrible loss of innocent life.

The first reaction of the politicians was to condemn Captain Schwieger. The captain, a tall, slim young man, not much over 30, and a zealous, patriotic officer, endured considerable humiliation after his return to Kiel.

SPIRITS OF THE ARMY

Then the imperial cabinet saw the effect on the country. The spirits of the army were cheered; the nation as a whole felt that we were breaking through the hated English blockade. The tide of opinion in official circles turned, and Captain Schwieger became a hero—a thing which, I might say, was distinctly distasteful to him.

Captain Schwieger lost his life in the U-boat service not long after the sinking of the *Lusitania*. His submarine struck a mine off the coast of Flanders during the next cruise and went down with all hands.

I know that there is heated feeling in England to-day over the sinking of the *Lusitania*. There is heated feeling also in Germany

about things which the Allies did. It is only natural, but as a German imperialist myself, I can see no reason why the *Lusitania* should not have been torpedoed.

She was a British armored cruiser carrying ammunition, armed with guns, carrying naval officers. She was, in fact, a warship. If innocent passengers lost their lives, then I simply deplore the fact that they were allowed to be on board.

What would England have said if the *Lusitania* had gone down through a mine? Fifty per cent of the work of our U-boats was mine laying; they scattered mines around the Irish, English, and Scottish coasts; mines were strewn across the mouths of British rivers.

There was never any complaint about losses due to German mines. The mine was an old instrument of warfare and condoned; the submarine was new and condemned.

After the sinking of the *Lusitania* we made rapid strides in U-boat development. It was difficult to believe that only two years before we had been almost afraid to use submarines in conjunction with our fleet.

The British were beginning, on the other hand, to organize an antisubmarine warfare, and we were forced to redesign our U-boats after every cruise.

U-boats were equipped with saw teeth at the bow to cut through submarine nets. Mine guards were fitted to the hull, and the caliber of the guns was enlarged.

We found that all our submarines must be oil-tight. A number of our vessels were lost through oil leaking out of the propeller shaft and floating to the surface. British destroyers were able then to track down our U-boats like an Arab following footsteps in the desert and destroy them with submarine bombs.

Our U-boat warfare against the armored cruisers like the *Lusitania* still continued, in spite of all protests from neutral countries.

LINER'S ESCAPE

At twilight on February 23, 1916, the *U–35* sighted a large 4-funneled vessel in the Cerigo Straights, off Malta.

"We saw her at 6.20 p. m.," the captain said in his report, "and I fired a torpedo. We missed. The range was too great, and the darkness hampered the accuracy of our aim. It was either the *Aquitania*, *Mauretania*, or *Britannic*."

If the ship had been struck there might have been another historic disaster. As it was, the *U–35* on the following day torpedoed and sank the French armored cruiser *La Provence*.

About this time three outstanding U-boat exploits took place.

The large merchant submarine *Deutschland* arrived in New York, to the amazement of all the United States.

The commander of the *U-53* called on the officer of the port at Newport on the American coast, presented his card, and left.

The *U-21* sailed through the Mediterranean to the Dardanelles and sank two British men-o'-war.

IV

Britain was defeated at the Dardanelles by one German submarine, *U-21*. This statement sounds absurd, but let me tell you the story.

U-21 and *U-20* were two of our most famous U-boats. It was *U-20*, under the command of Captain Schwieger, which sank the *Lusitania*. These two boats together had sunk H. M. S. *Pathfinder* in the Moray Firth in September, 1914. The *U-20* went down later off the Flanders coast. Almost at the same time the *U-21* was creating history by its famous trip through the Mediterranean and into the Dardanelles.

Captain Helsing, who survived the entire war and is alive in Germany to-day, living out the memories of his adventurous exploits in German U-boats, was in command of *U-21*. He performed on this trip one of the most important submarine actions of the war.

IRISH SEA RENDEZVOUS

On April 25, 1915, he received orders to leave Heligoland in his tiny craft of 300 tons displacement and make for the Dardanelles. No one believed he would be able to carry out his instructions.

He cruised northward, skirting the Orkneys to keep a rendezvous in the Irish Sea with one of our submarine depot ships which was standing by with fuel. Oil was transferred to the *U-21*. But Captain Helsing discovered at once that it was useless for his engines.

He was faced with the alternative of turning back for safety or going on in the desperate gamble that the limited supply of fuel which he was carrying would be sufficient to carry him through.

He arrived some days later at the Bay of Cattaro not far from Pola, an Austrian port in the Adriatic. He had barely half a ton of oil left when he dropped anchor in the harbor.

The *U-21* arrived in the Dardanelles on May 25, 1916, and promptly sank the British battleship H. M. S. *Triumph* off the coast of Gallipoli.

"MAJESTIC'S" FATE

Two days later the *U–21* discovered H. M. S. *Majestic* lying off Sedd-ul-Bahr, and cruising cautiously through the shipping about her, torpedoed her on the port side.

"I could see her list at once," the commander said, "and within three minutes she had heeled over at an angle of 45°, throwing all movable gear and her crew into the water. A few minutes later she capsized and sank. I made off at once, for I saw British destroyers concentrating on my position, and I feel sure that they followed me for some time before I escaped."

Captain Helsing arrived at Constantinople on June 5. He was greeted as the hero of the Dardanelles.

The British offensive was checked for some time, and all their schemes were crippled by the loss of these two warships. The little *U–21* had triumphed where Turkish batteries and men, British battleships and troops, had failed.

Before I go on to tell of other exploits I feel I must write an epitaph for the brave Capt. Otto Weddigen, the man who sank the *Cressy*, *Aboukir*, and *Hogue*, in the early part of the war with his little submarine *U–9*.

Captain Weddigen died on March 18, 1915, in a gallant action against the British Fleet. We did not know the full details of how he perished until after the war, because Admiral Jellicoe felt that any information that he gave concerning the fate of our U-boats was of value to us in our warfare. He makes this clear in his memoirs published since the war, and I agree with him; he was right.

Captain Weddigen encountered the English Fleet led by Jellicoe himself south of Norway. The entire formation was "zig-zagging" and steaming at full speed.

Our commander launched a torpedo at H. M. S. *Neptune* of the First Battle Squadron, but the torpedo missed and passed by her stern.

All of the bow torpedoes of the *U–9* had been fired, and the gallant commander, with full knowledge that the Fourth Battle Squadron was now steaming down upon him, rapidly put his helm over to direct his stern torpedoes at the British warship.

He was too late. H. M. S. *Dreadnought*, which was designed with one of the old-type ramming bows, caught him broadside on. The *U–9* was split in two and sank with her commander and crew. No one was saved.

Such feats of almost inhuman courage and loyalty were common in the German submarine circle during the entire war. Is it not

difficult for us German naval officers to keep our temper and our blood cool when we hear such men branded as murderers, fiends, and ghouls by an ignorant and bitter world?

Englishmen say that the *Lusitania* was the greatest recruiting argument that the British Nation ever had. The Americans state that the arrival of the *Deutschland* and the *U–53* in the United States was an eloquent warning to that Nation that it was time for them to take up arms with the Entente.

That may be true, but it was not the mistake of Von Tirpitz nor his officers. It was the weakness of the imperial cabinet of Berlin, who would not allow him to press home the advantage of these acts—to overwhelm the English and their supporters to such an extent that this first flush of enthusiasm and personal belligerence would be swept into despair.

The *U–53*, of not more than 750 tons, left Heligoland on September 17, 1916, and sailed directly for Newport.

AT NEWPORT

Twenty days later—the time occupied by some passenger vessels and most cargo boats—she arrived at Newport.

Captain Rose, the commanding officer, was brought into the harbor by a civil pilot; he stepped ashore in full naval officer's uniform, with sword, hired a motor-car, and drove to the offices of the port officer. He stayed long enough, and no longer, to leave his "card," and one hour later he was on board his submarine. He placed his uniform in his locker, scattered moth balls around, donned his white woolen jersey, and, resuming command, took his submarine out to sea.

He was in the United States waters for two hours and a half. He took on board no fuel, no water; he requisitioned no provisions.

The Americans believe in advertising in its most striking form. This was an advertisement for the German U-boat service. It was meant to be an advertisement, and nothing more.

But after the advertisement had taken place the *U–53* got down to business. On her way home she sank seven British ships and arrived in Germany after covering 7,750 sea miles without once replenishing her supplies.

V

Grand Admiral Von Tirpitz offered his resignation to the imperial cabinet twice during 1916. He was eventually dismissed.

No single blow directed against the U-boat service had such devastating effect. From that time on we were without a leader; henceforward the direction of the German naval and submarine warfare was divided and broken by strife.

The official figures issued by the English Admiralty show that we sank 4,696 ships of a gross tonnage of 9,400,000 tons, with a loss of 40,800 people, during our U-boat warfare. Those figures represent the substance and result of our submarine campaign.

We of the naval staff knew that the war would be won by the nation that had the greatest and most enduring nerve. It is an eternal tragedy that Germany weakened first and that England, our only real enemy right up until the armistice, was cool and determined.

Before I close my story and approach the dark days of the German eclipse I want to relate the experiences of Capt. Arnold de la Pierre, a German U-boat commander, who outwitted the British Navy by his sheer daring.

Captain de la Pierre left Cattaro in the Adriatic toward the end of 1916 on a U-boat cruise. He was detected almost as soon as he entered the Mediterranean by five British destroyers. He was surrounded. His submarine was designed to dive to a depth of not more than 30 meters, and when he submerged he found that he was attacked by depth charges.

The U-boat was rocked by the force of the submarine bombs. The electrical equipment was shattered. Torpedoes were thrown from their racks by the force of the explosion.

There was only one thing to do—to come to the surface and risk either surrender or being rammed by enemy craft or to descend to a lower depth and escape the danger of the British depth charges.

Captain de la Pierre decided to go down, and the submarine descended to a depth of 80 meters. All noises were obliterated. The sea pumps were stopped, the air refreshers were turned off, the dynamos and engines were shut down. Now it was a test of endurance. Could the German U-boat crew outlast the British destroyers?

The air in the submarine became poisoned and many of the men were overcome.

The ballast tanks had been damaged and the submarine was slowly filling with water.

"I was their father," Captain de la Pierre explained to me when this terrible adventure was over, "and the men looked to me for protection.

"When they became unconscious I gave them champagne, which we kept as an emergency ration.

"We were submerged for 18 hours, and then we decided to come to the surface. As soon as the pumps began to work the U-boat started to lunge toward the surface in wild, uncontrolled leaps. She was like a wild beast that had been persecuted and was suddenly released."

While Captain de la Pierre was returning to his base at Cattaro he heard the British destroyers sending wireless messages to their base at Malta that they had sunk his U-boat with depth charges.

This was only one instance. It was a case where a strong man was able to outwit his enemies. But there were many, scores and scores, of German U-boats which were destroyed in this fashion by British torpedo boats.

It must be remembered that during the whole war only 360 U-boats and U-cruisers were put into active service, and of these 210 were lost.

Toward 1918 the English were demonstrating excellent seamanship and ingenuity in their anti-U-boat warfare. Their mystery ships were sinking many of our submarines. They were able to track down the movements of our U-boats with the use of directional hydrophones.

But let me say now that we had no more gallant enemies than the British Navy, and there was no officer whom we respected more than the British naval officer. His courtesy was invariable; his courage and his ability we always recognized.

In the early spring of 1918 the army command opened their great "push." The navy in the meantime had been deteriorating rapidly. The equipment in the high seas fleet had become useless, and everything the crews used was a compromise and a substitute. We had no copper, brass, or nickel. Our boilers were patched with makeshift material. Our men-o'-war grew more decrepit with each succeeding month and repeated repairs became more necessary.

Ludendorff was making his last stand and he requisitioned all the available men from our dockyards.

"We must have fresh men," was his demand, and the German Navy suffered as a result. In place of our craftsmen we were given the misfits for the battle field. Our dockyards were manned with cripples, wounded soldiers whose disabilities rendered them almost useless. How could we repair our fleet with men of this caliber?

The sailors were growing more disgruntled. The spirit of the Battle of Jutland had vanished.

After all, Admiral Scheer had warned the Emperor, and his warning had reached the lowest man in the fleet.

"Jutland makes no difference to England," he had told the imperial cabinet when the enthusiasm following the battle was at its highest pitch. "You must go on."

British airplanes were sweeping now over the North Sea. Fast surface boats of small tonnage, yet armed with rapid-firing guns were patrolling our waters.

Nets hung with mines were laid across the English Channel and along the Belgian coast. Everything that human invention could devise was produced. The very existence of England depended on

her antisubmarine warfare, and we, foolishly enough, had allowed her time to prepare her defense.

Convoys were trained. New merchant ships were being built every day. We were giving our enemies time—that was all that they needed.

British destroyers and submarines were hemming us in in the German Ocean. The enemy mine fields, which were laid with the support of the Americans, became a nest of death. Allied patrols were scattered everywhere over the North Sea, the English Channel, and the eastern Atlantic. It was almost impossible for our U-boats to move without being detected.

TREMENDOUS HANDICAPS

Our U-boat construction at home was proceeding rapidly but under tremendous handicaps. All of our materials were a substitute. Yet, in spite of those handicaps, 440 U-boats were under construction, and a further order for 330 submarines was under way.

We were planning, as you can see, for a war that would last until 1920 at least. We had really only begun to wake up.

We were now in the midst of unrestricted U-boat warfare. The remnants of our high-seas fleet were concentrated entirely on assisting the submarines. Our personnel, which had been badly depleted, was being recruited as fast as possible. But it seemed useless. The spirit of Heligoland, at the submarine base at Emden, had changed. Our submarine crews were loyal, but they had lost their nerve.

The rumblings of discontent were now heard in our high-seas fleet. The situation became more manifest. Our great advance in France had failed. Our children, our mothers, were starving. Our treasury was depleted. Our Emperor was growing weaker with each day. Bitterness had sprung up among the politicians, and the commands of the navy and the army were at open defiance.

We were divided among ourselves. We were split like a group of men, once united in success and now broken asunder in defeat. There was no one in all Germany wise and strong enough to rise above these factions, to dominate the spirit of cowardice, to discipline the mob, to save the German Empire.

Our U-boat service had lost its effectiveness and reorganization was taking place. It was the last feeble stand. I returned to the high seas fleet and took command of the battleship *Heliogoland.*

After three years and more of the submarine service I was almost sickened by the discoveries I made on returning to the fleet. It was not the great German High Seas Fleet of Von Tirpitz. The machine-like training had vanished. The crews were slovenly, lazy, almost insolent.

There was practically no discipline. The brass-work was dirty. the guns were unpolished. I felt like Rip Van Winkle returning to the scene of his former life. It was as though I had died and returned 20 years later—and nothing had been done in my absence.

I know I will find a professional sympathy among the officers of the British Navy. Let them try to imagine such an experience for themselves; let them try to think of the great battle cruiser *Hood*, or the *Nelson*, or the *Rodney*, rust-eaten, dirty, unpainted, undisciplined—I know it would bring tears to their eyes.

After all, we naval officers have the same code the world over, no matter to which navy or which country we belong. It is the universal code of the sea. England would have been broken by such degradation.

To talk of those days makes me very sad. I feel like a man who has been great and wealthy, popular and acclaimed, and finds himself now an outcast. We German imperial naval officers are the naval outcasts of the world.

THE DAY

There is only one more story to tell. I was captain of the *Heligoland* on the night of October 5, when the German High Seas Fleet received orders to make for the open sea, to find the British Navy, to fight until death.

There has never been in my life such a great moment.

It seemed for once in my naval career that I would achieve that for which all German naval officers had lived—a fight with the British Navy until death.

There was not one man who wore the Emperor's imperial crown on his sleeve, who had been brought up in the great German ideal of Grand Admiral von Tirpitz, who had not lived for this day. It was "Der Tag."

Jutland seemed to us at that moment like a child's play with model ships on a park pond. This, at last, would be the greatest naval engagement of all history, the greatest naval engagement for generations to come.

I stood on the control tower with my officers, and telegraphed to the bow to weigh anchor. The officer signaled back to me. I could hear the clank of the winches, the hiss of the steam, and I felt the blood running through my veins.

Then suddenly the steam died away, and the anchor fell back into the sea with a splash.

It is difficult to go on with this story. It is difficult for a naval captain to tell of revolution in his own ship. But that is what had happened. My crew—German sailors—had mutinied.

VI

Revolution had broken out in my battleship, the *Heligoland.* The men were passively resistant. They simply stood by, mute, motionless, paying not the slightest heed to my commands, but refusing so far to offer any violence.

The story of this mutiny in my ship has never been told before. It is of vital importance, for it was these men—my own crew—who were responsible for starting the revolution which swept through Germany within the next few days and led finally to the Emperor's flight to Holland to prevent bloodshed.

It was now approaching midnight on October 5. A few hours previously I had attended with all other captains of the fleet at a conference with Admiral von Hipper in his flagship, *Frederick der Grosse.* We had received our instructions orally, nothing was written down, and the German High Seas Fleet had been ordered to a rendezvous about a hundred miles out to sea from Heligoland. From there we would steam out to meet the British fleet to "fight until death."

I had called my officers into my saloon and told them of the decision of the fleet, and we had taken up our stations, when the crew rebelled.

I addressed them. I ordered them to their stations, and they simply refused to move. I appealed to them to be loyal to the fatherland, and they replied that the fatherland had deserted them.

The electric lights began to grow dim, and officers from the engine room reported that the stokers had withdrawn their fires.

I signaled to the nearest battleship, *Thueringen*, and received no reply. At the same time I saw the crew of the other vessel signaling to mine that they had taken possession of the ship.

I heard revolver shots below, but it was the crew apparently firing among themselves. They had taken charge of the gun turrets, the ammunition, and the strategic points of the ship.

My officers who went to locate the trouble returned and said that they had been driven back by a shower of coal thrown at them by the mutineers.

I and my officers were powerless, and we remained empty-handed in the control tower until 4 o'clock in the morning.

I retired to my saloon for a few minutes rest and found the only loyal rating in the ship—my guard—who came smartly to attention when I approached. An hour later he went over to the mutineers when six armed stokers knocked on the door of my sleeping cabin and demanded an audience.

I ordered them to lay down their arms at once, return the keys of the ammuntion stores, and surrender the gun turrets and torpedo tubes.

"We will agree," they replied, "on certain conditions."

"The only conditions are my conditions," I declared, "and those conditions are that unless you surrender immediately I shall blow up my ship with myself, my officers, and all of you men aboard."

The stokers left saying that they would consult their mates. In the meantime I went ashore to consult the admiral of the First Battle Squadron. We decided to take drastic action.

Two large destroyers and two large submarines which were lying alongside and were manned by loyal crews were boarded by the admiral, the captain of the *Thueringen*, and myself. We steamed out into the roads where the high-sea fleet rode at anchor and turned our guns and torpedoes on the two mutinous battleships.

"Surrender at once. Come on deck with hands raised," we signaled, "or we will fire."

We stood for some minutes waiting for their reply in an agony of suspense. It would have been terrible to kill my own men in such cold blood.

The mutinous crew had manned the gun turrets aboard the two battleships and the muzzles were leveled toward our four small craft.

One thing the sailors did not know was that the firing pins in the breeches had been drawn by loyal petty officers.

We waited for some minutes and the admiral was about to give the order to fire when a white flag was hoisted on the *Heligoland*.

Both battleships were boarded immediately and the crews, hands, aloft, were lined up. One hundred and sixty men, the ringleaders, were taken off in lighters from my ship, the *Heligoland*. Nearly 300 were arrested aboard the *Thueringen*. All of them were taken up to Wilhelmshaven under a strong armed guard of royal marines, and they went off defiant, singing the "Marseillaise."

At Wilhelmshaven the mutineers were entrained to go to the prison at Bremen. When the train arrived there the royal marines had gone over to the side of the rebels. The military authorities at the station were impotent in the face of the rabble and they marched through the town to the gaol and released the prisoners.

SPREADING THE REVOLT

The German revolution had started. These same men marched to adjacent towns spreading the revolt, which reached its climax finally in Berlin.

On November 16, five days after the armistice, I was ordered to prepare the *Heligoland* for sea to escort the first 24 submarines to Harwich, where they would be handed over to the British fleet.

We passed through the old mine fields with our tragic convoy on November 17, and at dawn on November 18 we sighted the gray lines of the British fleet 12 miles off Harwich.

Lean British destroyers scurried around us like speed boats, and two lines of cruisers hemmed us in on each side.

A single cruiser steamed ahead and signaled:

"Follow me."

The guns of the English men-o'-war were trained on us. The British crews wore gas masks and stood at "action stations." Everywhere we looked we saw the British white ensign, the neat round hats of British sailors.

UNDER THE WHITE ENSIGN

"Stand by to anchor," the British cruiser signalled.

I repeated the order with bitterness.

"Anchor."

I let go.

The submarines were boarded by English crews, and almost at once I saw the white ensign fluttering on the jack staff of everyone of our U-boats. The German imperial ensign flew below.

I handed over the command of my vessel to my first lieutenant and retired to my cabin and locked the door. Hours later, when the formalities were over and the German crews from the surrendered submarines had been transferred to the *Heligoland*, we left for home alone.

On my return to Heligoland I was appointed marine superintendent of Hamburg, and my duties consisted largely in checking the communist activities and the terrorism which was sweeping the city. I was a member as well of the commission which was in charge of the German shipping companies, which had been ordered to surrender their merchant fleets to the Allies.

The "Reds" had commandeered one of our disarmed cruisers lying in the harbor, and 8,000 soldiers in barracks refused to lay down their arms and were in open revolt. A price of 50,000 marks had been placed upon my head by these communists.

In August, 1919, I was dragged from my bed early one morning by a group of communists, all heavily armed, and driven through the deserted streets of the city in a motor car to my offices. I was told to resign at once, and given a few hours to make my decision. Otherwise I would be shot on sight.

I returned to my home, and a guard was placed around the house.

The revolutionaries did not know, however, that there was an old cellar leading into the garden at the back. I escaped this way, climbed over the wall into the adjoining property, and got away through a house facing the street behind. I motored to Friedrichsruh

and dispatched a messenger by airplane to Berlin. An armed body of 2,500 loyalists and the " Iron Flotilla "—a few patrol boats which were manned by loyal sailors—were concentrated on Hamburg.

The battle was over in a few days, and the communists were swept from their hiding places.

My work was done. Sick at heart, I applied to the socialist government to be retired, and on September 22, 1919, I severed my connection with the remnants of the imperial navy, the German Empire, and all the associations of a life of service under the imperial régimé. and went into retirement.

CURRENT ARTICLES OF PROFESSIONAL INTEREST

The Father of Admiral Farragut. By Charles O. Paullin. (The Louisiana Historical Quarterly, January–March, 1930.)

The Problem of the Nile. By Pierre Crabites. (Current History. July, 1930.)

The United States of Europe. By Count Sforza. (Current History, 1930.)

The British Empire as an Economic Family. By Sir Basil Blackett. (The Nineteenth Century.)

Mussolini's Foreign Policy. By Maj. E. W. P. Newman. (Fortnightly Review, July, 1930.)

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GUNNERY NOTES

JAPAN

CAPTIVE BALLOONS DISCONTINUED ON JAPANESE SHIPS

Recent reports indicate that the present practice of carrying captive balloons for range finding, observation, etc., on board capital ships of the Japanese Navy is to be discontinued owing to the development of Japanese naval aviation, and the substitution of airplanes for this purpose. The balloons will eventually be attached to the defense corps of naval stations. Captive balloons will still be used by destroyer squadrons, such as for observing torpedoes during practices, etc.

FRANCE

RAPIDITY OF GUN FIRE, FRENCH DESTROYER LEADER AND DESTROYER

The 5.5-inch guns on the French destroyer leader *Bison* (2,436 standard tons) are reported as having been recently tested for rapidity of fire, results indicating that eight aimed shots per minute can be fired.

The 5.1-inch guns on board the destroyer *Froudroyant* (1,377 standard tons) are also credited with having attained a rapidity of eight aimed shots per minute.

FRENCH NAVAL OPINION ON NEW LIGHT SURFACE CRAFT

The following recent report setting forth a French naval opinion on modern light surface craft is considered of interest, particularly the view respecting torpedo tubes:

> French destroyer leaders are unique in that they are the largest in the world. They are practically light cruisers. They have been subjected to some criticism, as they are obviously not a match for the 5,200-ton Italian light cruisers. French naval opinion is not yet certain whether or not they are too large. It is felt that three *Jaguars* would be superior to two Italian *Esploratore*, even though their total tonnage is less. The commanding officers of the leaders are well satisfied with their boats, as they are very seaworthy, fast, and have great radius of action.
>
> In destroyers, too, the French type is the largest built. It is thought that perhaps the classic 1,000-ton type has been left too far behind. The French boats present too conspicuous a target and have too large

a turning circle to make them the best for night torpedo attacks. Furthermore, their guns, 130 mm., using separate ammunition, can not fire rapidly enough for the cat-and-dog fights in which such craft may engage. They are, however, excellent sea boats. Seaworthy qualities have been sought for before everything. Perhaps it would be desirable to return to the pure torpedo-boat type with smaller, more rapid-firing guns and displacement of about 1,000 tons.

Practically all French officers are of the opinion that the torpedo has been given too much emphasis on all their light surface craft. Except on the submarine the torpedo did not play an important part in the last war. Furthermore, the torpedo is a double-edged sword and may turn against the ship carrying it. The presence on deck of a steel tube containing air under high pressure and a large charge of guncotton is not conducive to a feeling of security. Perhaps both the number of tubes and the number of torpedoes carried is too great. The gun is always the final arbiter.

The best results are obtained when firing torpedoes from fixed bow tubes. The ship rather than the tube should be oriented. Broadside tubes should not be done away with entirely but fixed tubes permit simple, easy firings and avoid errors. What more rational than to fire a torpedo from a bow tube while charging at the enemy?

ITALY

ITALIAN MAIN AND SECONDARY BATTERY GUNS

Certain characteristic details of the new guns in the Italian Navy are reported as follows:

8-inch 50-caliber for 10,000-ton cruisers.
6-inch 53-caliber for 6,000-ton cruisers.
4.7-inch 50-caliber for 2,000-ton cruisers.
4.7-inch 45-caliber for postwar destroyers.
3.9-inch 47-caliber antiaircraft for cruisers.

All old guns are built on the principle of initial tension except the Armstrong 12-inch 46-caliber, which are wire wound. The battleship guns are both Armstrong and Vickers.

Manufacture.—Guns are now manufactured by Ansaldo and Odero Terni. Ansaldo is at Genoa and makes forgings and finished guns. Odero Terni is at Spezia, and the forgings come from the Terni plant of the same corporation near Rome. All gun steel is acid open hearth.

Assembly.—Ansaldo guns are *monoblock* while Odero Terni guns are *built up*. The navy apparently has no preference between the two.

Rifling.—Rifling is uniform twist with wide grooves about two to two and one-half times width of lands.

Liners.—The following table shows the liner details:

Gun	Assembly	Liner
8-inch 50-caliber	Monoblock	Trento and Trieste; must be bored out. Newer cruisers, removable cold; not interchangeable.
6-inch 53-caliber	Monoblock built up.	Removable cold; not interchangeable.
4.7-inch 50-caliber	Monoblock	Removable cold; interchangeable by groups.
4.7-inch 45-caliber	Built up	No liner; first guns. Newer guns, removable cold; interchangeable.
4.7-inch 27-caliber (submarine).	do	No liner.
3.9-inch 47-caliber (antiaircraft).	do	Removable cold; interchangeable.

Removable liners are supposed to be removable aboard ships, but spares are not carried on ships.

The elastic limit of the 4.7-inch 50-caliber liner is said to be 106,000 pounds per square inch. An experimental 12-inch removable liner recently manufactured is reported to be of molybdenum steel, tensile strength 177,700 pounds and elastic limit 142,000 pounds per square inch. Liners are oiled before insertion.

Service pressure.—This is said to be 3,000 kilograms per square centimeter (19 tons per square inch).

Specifications.—Gun specifications are confidential. It is believed that the following information is correct:

(*a*) *Test bars.*—From each end of the forging four bars are tested, viz:

1 tensile test, transverse.
1 tensile test, longitudinal.
1 bending test, transverse.
1 bending test, longitudinal.

If forging is too small, the number of bars is reduced, transverse bars always being taken if possible.

(*b*) *Microscopic test.*—Even if the tests are successful, but fractures or other indications point to defects, miscroscopic tests are made of the end of the forging in question. If the microscope confirms the doubt, the ministry decides whether or not the piece shall be re-treated or rejected.

(*c*) *Chemical properties.*—

Sulphur, maximum, 0.04 per cent.
Phosphorus, maximum, 0.04 per cent.
Copper, maximum, 0.065 per cent.
Nickel, prescribed by manufacturer; tolerance, plus-minus, 0.25 per cent.
Chrome, vanadium, etc., prescribed by manufacturer; tolerance, plus-minus 0.1 per cent.

(*d*) *Physical properties.*—It is understood that Italy has recently revised her specifications for gun steel. The 1921 specifications

classed liners, tubes, jackets, hoops, and mushrooms together. The minimum requirements were then as follows:

Tensile strength, 92,500 pounds per square inch.
Elastic limit, 56,900 pounds per square inch.
Elongation, 15 per cent.
Contraction, 30 per cent.

THE MINE SITUATION IN THE ITALIAN NAVY

The following notes cover some details of the current mine situation in the Italian Navy:

Mine Organization on Shore

(*a*) *Navy Department.*—The chief of staff is responsible for war plans and for the constitution of the naval forces. Under him, in the division of organization and mobilization are—

Office II. Efficiency of surface ships.
Office III. Efficiency of submarines.
Office IV. Coast defense, including obstructions, mines and sweeping, and liaison with the Army for coast defense.

All ordnance activities are grouped under the director general of arms and naval armaments. Under the director are several divisions, one of which is the " division of underwater arms." This division has cognizance over—

Mines.
Mine-launching gear.
Specifications for foregoing.
Organization of production in peace and war.
Supervision over professional features of mine schools.
Mine-sweeping gear and specifications thereof.

Thus, the chief of staff is responsible for the operation and planning, and the director of naval arms provides the material and sees that the proper features are taught in the mine school.

(*b*) *Naval districts.*—Commanders in chief of naval districts are responsible for the mine defense of harbors in their districts in accordance with the defense plan of the general staff. This is carried out through local commanding officers, and, in some bases, are found " Officers in charge of naval defense," whose duty is the defense of the port.

All mine sweepers are attached to the shore commands. The regular mine layers have speeds from 10 to 15 knots and are, in general, fitted as sweepers. Paravanes are fitted on battleships, cruisers, scouts, and destroyer leaders.

(*c*) *Special training of personnel.*—(1) Officers of the Naval Arms Corps have technical training starting at the Naval Academy, the midshipmen wishing to enter that corps having a separate course.

(2) The officers of the Naval Arms Corps are specialists within the corps, one of the specialties being that of "underwater arms." This corps was initiated recently.

(3). For sublieutenants of the Naval Arms Corps who have been at sea, there is a postgraduate course of two years at an engineering school, the result being a degree in industrial engineering.

(4) In the line there were recently the following specialists in "underwater arms":

2 commanders
8 lieutenant commanders
26 lieutenants

(5) There is an underwater arms course for officers at Spezia, where the torpedo and mine schools for enlisted men are also located.

(6) At Spezia there is a special mine course for volunteer enlisted men. This course turns out about 50 men per year.

Mine Organization Afloat

In the First Squadron there is no mine-laying group separate as such. In the Second Squadron there is a mine-laying group of two mine layers, each carrying 200 mines.

Vessels assigned to the fleet carry mines as follows:

Ships fitted to carry mines

FIRST SQUADRON

Type	Ship	Number of mines
Scout	12 Malocello class	[1] 40
Light cruiser	Ancona	120
Destroyer leader	Leone	100
Do	Tigre	100
Destroyer	4 Sauro	[1] 30
Do	4 Ricasoli	[1] 30
Submarine	4 Balilla	[1] 24
Do	Fieramosca	24
Do	2 Corridoni	[1] 18
Total mines, First Squadron		764

SECOND SQUADRON

Type	Ship	Number of mines
Light cruiser	Taranto	120
Do	Bari	120
Destroyer leader	Riboty	100
Do	Falco	50
Destroyer	4 Fabrizi	[1] 10
Do	Carini	10
Mine layer	Milazzo	200
Do	Dardanelli	200
Scout	Mirabello	100
Do	Quarto	200
Do	Aquila	50
Total mines, Second Squadron		1, 190

[1] Each.

Total mines in fleet ---- 1, 954

Types of Mines

Remaining from the war, Italy has a stock of old Italian mines, spherical and without horns. There are also some old French, German, and Austrian mines.

The modern standard mine of the Navy is the Vickers-Elia mine. It is understood that Italy is making very few mines, although the Elia plant is constantly experimenting. Mines have been bought from England. The latest mine is understood to have seven horns, and to have been anchored in 150 fathoms. It is reported that the Elia mine will anchor in 500 fathoms. The explosive T. N. T. is about 320 pounds.

During the war the Italians sank the Austrian battleship *Viribus Unibus* by a special device described in the Naval Institute Proceedings of December, 1928.

Mine Doctrine

It is understood that in Italian naval doctrine, mines are not considered in connection with an action at sea, and that the fleet is not organized with such a possibility in mind. Mines are intended to be used as follows:

(*a*) *Port defense.*—Handled by the shore establishment and is the primary use of the mine.

(*b*) *Sea barrage.*—Is considered possible in the Straits of Otranto, across the mouth of the Adriatic. Such a barrage existed in the World War. A barrage from Sicily to Africa is considered out of the question on account of the strenuous objection that would be made by Great Britain. The only barrages considered are the Straits of Otranto and Messina; the "Rivista Marittima" for October, 1929, contained an article on Movements of Mines, showing that deep mining is not a dead issue.

(*c*) *Blockading enemy ports.*—It is understood that if opportunity offered, the mine-laying ships of the fleet would be used to hinder the movements of the enemy in entering and leaving anchorages.

(*d*) In general, it is believed that the mine is considered almost entirely a defensive weapon.

Conclusion

Generally speaking, it is believed that a nation at war with Italy would find—

(*a*) Italian bases and ports mined.
(*b*) Mine barrage, Straits of Otranto.
(*c*) Mine barrage, Straits of Messina.
(*d*) Attempts to mine around its forces at anchor in the Mediterranean.
(*e*) No use of mines against forces at sea.

GERMANY

1930 NAVAL GUNNERY EXERCISES IN KIEL BAY

The annual gunnery exercises of the German Navy are being carried out this month (August) in Kiel Bay north of the Kiel lightship in a part of the bay little used by shipping. It is reported that the radio-controlled old battleship *Zahringen*, cork-filled, is again being used in this practice.

The vessels engaged in the practice are said to include the old battleships *Schlesien*, *Hannover*, *Schleswig-Holstein*, and *Hessen*, and the new 6,000-ton 32-knot cruiser, *Königsberg*.

Königsberg is said to have scored several hits with her nine 6-inch guns, firing at the *Zahringen* while the latter was making full speed. A Berlin press report states that during this practice the radio-controlled battleship target made " a smoke screen, under cover of which she doubled in her track, and tried to escape, but *Königsberg* also turned and began a running fight, to which *Zahringen* simulated a reply by firing rockets—also discharged by a distant-controlling hand."

The night-firing practice is described as follows: *Schlesien* and *Hannover*, steaming in company, were attacked by torpedo boats, in the form of naval tugs towing targets, all vessels engaged being darkened. At 2200 the attacking torpedo boats were sighted by *Schlesien* 4,000 yards to starboard and a salvo of shells was fired which released flares attached to parachutes, at a height of 1,500 feet above the seas. The attacking vessels were plainly revealed, and the second salvo from the battleship wrecked the targets.

GENERAL NAVAL NOTES

GREAT BRITAIN

STRENGTH OF ROYAL AIR FORCE STATION AT SINGAPORE

During a recent (July, 1930), hearing in the House of Commons, the Under Secretary of State for Air, in answer to a question put as to the amount of money that had been spent on Air Force work at Singapore and of what the Air Force garrison stationed there would comprise when the base was completed, stated as follows:

"The answer to the first part of the question is that approximately £358,000 has been spent to date. As regards the second part, the strength of the Air Force which will normally be stationed at Singapore as at present contemplated is one squadron of flying boats and one squadron of land machines, apart from any fleet air arm units which may from time to time be disembarked there."

NAMES OF NEW BRITISH SUBMARINES

The names selected for the three new British submarines of the 1929 program, continue the alphabetical sequence which has been followed for underwater craft of the postwar replacement program. Formerly, British submarines were distinguished by initials and numbers. In 1924 there was begun the *Oberon*, and six submarines of the 1926 program also have names beginning with "O." The six of the 1927 program have names beginning with "P," the *Parthian* class; and the four of the 1928 program with "R," the *Rainbow* class. The reason for two initials in the program of 1929 is that the vessels will be of two distinct types. The two to be built at Chatham Dockyard will be of a coastal type, said to be of 640 tons, and will be named the *Swordfish* and *Sturgeon*. The one to be built by contract will be of an ocean-going type, said to be of 1,760 tons, and will be named the *Thames*.

NOTES ON H. M. S. "NELSON"

The following features were recently noted on board H. M. S. *Nelson:*

Torpedo tubes.—One port and one starboard, were observed to open forward with a boss in shell plating instead of outboard as usually designed.

Battery.—The six twin 6-inch turrets (three each starboard and port) were not examined at close enough range to determine thickness of protection, if any. From the dock side, an examination of the gun ports or turret front plates of the 6-inch guns did not indicate that the elevation of the guns would be as great as the maximum of 70°, although there is no other reason to suppose that they can not attain that elevation. Jane's "Fighting Ships, 1929" states that the "6-inch guns have 60° elevation and could, if desired, be used as antiaircraft."

On the upper deck between smokestack and main forward fire-control tower were noted four 4.7-inch antiaircraft guns, one of which was elevated to practically 90°. On a deck or platform just above the forward pair of 4.7-inch guns, were noted four guns which may have been the 3 pounders noted in "Jane, 1929," although they gave the appearance of being smaller (about 2-inch).

Handling rooms.—Opportunity was afforded to enter the handling room for one of the 4.7-inch guns and to take a hasty look into the adjoining handling room of one of the 6-inch turrets, but not to enter or examine the latter in detail. It was an inclosed compartment about 8 or 10 feet in diameter, with a central ammunition hoist. The 4.7-inch ammunition is handled by two stage hoists, the lower one terminating on the third (armored) deck, but extending well up to a point under the second deck. Powder (separate from shell) is thence transferred to the lower end of the hoist leading up to the gun. No shell stowage was observed, although a wood and brass lined shell handling trough, shaped in the arc of a large circle about the outside of the 6-inch handling rooms, was noted leading to the base of the upper stage ammunition hoist to the 4.7-inch guns; it is probable that powder and shell are both handled in this upper-stage hoist, which appeared to be an endless chain principle. In one of these rooms there was on exhibition a wooden model, in half section, but to full scale, of a 16-inch projectile, standing some 6 or 7 feet high.

Sixteen-inch turret armor.—The visible joint of 16-inch turret front plate to side armor was noted to be about 8 inches thick. It is presumed that the rabbet in front plate (not visible) would take up an additional amount not exceeding 4 inches, which, if correct, would indicate the turret front plate to be not over 12 inches thick. The joint between roof plate and side armor of main turrets indicated a visible thickness of about 4 inches. An open hatch in the shelf plate of one turret indicated a thickness for this shelf plate of about 3 inches or possibly 2½ inches. The entire rear side of each turret (constituting an arc of a circle of large radius) was covered with a series of light sheet metal closing plates each about 2 feet

transversely by 4 feet vertically, all in a transverse row at about mid-height of turret, totaling in number some 8 or 10 across the rear of the turret, and each fitted with two raised grips at sides for handling, and apparently secured by four tap screws or bolts, one at each corner. The purpose of these sheet-metal cover plates, fitted over 4-inch circular perforations in the turret back plates, are either to release abnormal blast pressure within the turret or else for purposes of turret ventilation in action.

Ship and fire control.—The upper end of the conning tower terminates in a large mushroom-shaped armored hood, which has a maximum height to top of mushroom of about 3 feet and a diameter of approximately 5 feet. In front of it, alongside each other, were noted two ports or doors, each hinging along the outboard (vertical) side and probably covering two periscopes. In addition there were noted on top of conning tower what appeared to be two smaller brass-encased periscopes, which were not otherwise covered over in any way. At the rear were noted a hand wheel and operating gear apparently designed to open and close an armored door about 18 by 30 inches in the rear of the hood. The conning tower itself was noted to be of an irregular shape. The forward face was on the arc of a circle of large diameter with three peep holes each about 30 inches long in the forward face, total width of chord transversely probably not more than 8 feet; the top edge of the forward face was arched slightly upward. The sides of the conning tower were practically plane surfaces extending slightly outward to the rear giving a maximum breadth transversely at their after edges of 10 or 12 feet; the after side of the conning tower was curved to a much smaller radius than the forward side, giving a total depth fore and aft on center line from outside of front plate to outside of back plate of about 12 feet. At the top of the forward fire-control station was noted a small, apparently revolving, turret-like structure in general similar to the conning tower and mushroom hood thereon but to about one-third scale. It is presumably the 4.7-inch antiaircraft director and control station. Range finders and fire-control and director towers are in general, in location and proportions, as indicated in the plan view given on page 30 of Jane's "Fighting Ships, 1929."

Structure.—Throughout the forward part of the vessel, and at least as far aft as the midship section, the upper deck is framed on the longitudinal system with longitudinal girders built up to a depth of about 12 inches, spaced about 6 feet apart near the side and opening out to a greater spacing (about 8 or 10 feet) toward the center line, and with deck stanchions of about 8 inches external diameter. The second deck is framed on the transverse system at about 4-foot frame spacing and of about 8 by 3½ inches channel

sections. An opportunity was had at a hatchway in the third deck to confirm that the protective deck is at least 6 inches thick and possibly slightly but not greatly thicker, i. e., as much as 6¼ or 6½ inches. From the rabbeting in the hatchway seen, it would be estimated that the two parts of the rabbet were respectively 2½ and 3½ inches thick. At this point it was unquestionably a single thickness throughout. A report that extensive arc welding of protective deck plating had been resorted to in *Nelson* and *Rodney* has been denied in authoritative quarters. It was observed that the space traversed on the third (protective) deck was well subdivided with a fore and aft bulkhead extending more or less continuously along each side of the ship on a line about one-fourth the beam of the ship in from the side; i. e., about 25 feet from the side, with an additional bulkhead in way of machinery spaces inboard of this; with numerous transverse bulkheads isolating the various ammunition handling compartments, and with large water-tight doors of an unusually great width (at least 4 feet) at intervals for accessibility. The weather decks are now planked with teak. The three 8¼-ton anchors were out of the ship while in dry dock. Several others (possibly four) for P–V gear were noted stowed about the forecastle; a leading seaman was giving an illustrated lecture on their use to a large crowd of visitors, a large-scale brightly colored perspective chart in considerable detail being used to demonstrate the action against mines.

No aircraft nor provision for same, in the shape of catapults or catapult foundations, were observed anywhere on board the ship.

NOTES ON H. M. S. "RODNEY"

The following features of general interest were recently noted on board H. M. S. *Rodney:*

(*a*) The unusual degree to which wood is employed throughout the ship, even to the extent of being used as coaming along the deck edge.

(*b*) The absence of waterways.

(*c*) The extensive use of white paint with just enough green coloring to eliminate the dead flat white color throughout various compartments and areas within the ship.

(*d*) The absence of electric battle lights, and the plentiful distribution throughout the ship of brass oil lamps secured to bulkheads with clips.

(*e*) The simple form of ladders used together with the attachment of same to hatch coamings.

(*f*) The restriction in size of hatch openings for access of personnel. For access to various bridge levels the width of the ladders, of which there are two rigged in each hatch, is approximately 18 inches whereas the hatches leading to larger spaces at lower levels

were wide enough to permit at least two people passing on the same ladder.

(*g*) The use of linoleum on bridge deck levels, even where exposed to the weather, secured with extremely heavy brass battens.

(*h*) The scrupulously careful way in which paint was applied and the excellent condition of all bright work throughout the ship, particularly name plates.

TURKISH GOVERNMENT OBJECTS TO VISITS OF BRITISH NAVAL VESSELS

In the course of their summer cruise units of the Mediterranean Fleet, including battleships, cruisers, and destroyers, have during the past four years visited Turkish islands and bays on the Ægean. A recent press report states that this year the Turkish Government has notified the British Embassy that it can not see its way to allow the visits which are due to take place this month and in October, to Budrum, Marmaris, Iasus Bay, and Ayas Bay (on the southwest coast of Anatolia). The British ships will, however, be allowed to visit Imbros if they so desire.

No reasons are given for the refusal, but it is said that the Turkish Government is averse to these visits becoming annual affairs. This somewhat unexpected refusal on the part of the Turkish Government will entail some changes in the plans of the Mediterranean Fleet during the next few weeks.

THE BRITISH STAFF COLLEGE AT CAMBERLEY

The following notes on the British Staff College at Camberley, England, were made during a recent visit to that institution:

Notes on the Course and Organization

The objects of the course are—

(*a*) Training in staff duties and in the qualities for command.

(*b*) Study of the higher branches of the science of war.

In the first year of the course (junior division) instruction is mainly directed to the training of officers in the technique of staff work, administrative and tactical, in the field, chiefly as concerning formations not higher than a division.

Tactical instruction in the handling of units and formations of a small force is carried on simultaneously.

General instruction to broaden an officer's outlook and in the individual and cooperative rôles of the various arms is also given.

At the end of his first year's course a student should be capable of filling efficiently any junior staff appointment in a division.

In the second year of the course instruction is given in the staff duties in higher formations.

The higher administrative functions of the staff are studied and staff duties in connection with certain special types of operation, e. g., combined operations—mountain warfare, etc.

There is, however, no very distinct line drawn between the standard of instruction given to the junior and senior divisions, and students are frequently taken back to the more elementary subjects as well as dealing with larger tactical and strategical problems.

Military history is referred to in order to illustrate definite points—complete campaigns are not studied in detail, although students are encouraged to read military history.

The syllabus for the entrance examination insures that students join with a good general knowledge of military history.

In general, the course is conducted on the lines of a university rather than a school.

The points to which special attention is paid are—

> The development of character by promoting in students self-confidence, sound judgment, and a realization of essentials; power of rapid and clear reasoning and decision and of clear and concise expression, both in writing and verbally; of original thought; intelligent and loyal acceptance of criticism, and power of constructive criticism.

Principles, staff technique, and factors affecting the handling of the various arms are definitely taught.

Officers work as a rule in groups (syndicates) of varying size and composition according to the nature of the exercise; tasks being distributed among members of the group.

The work of the group is criticized and officers are generally left to apply criticisms to their own share of the work.

The competitive element is as far as possible eliminated.

Officers are encouraged to share with others their special experience, and, to promote this, syndicates are composed generally of officers of different arms.

On the completion of the full course a considerable percentage of the officers should, with a little practical experience, be fit to fill first-grade staff appointments, and almost all could fill second-grade appointments.

An officer after leaving the Staff College as a rule returns to his regiment for a year and then is placed in a third-grade appointment, though a few may receive second-grade appointments.

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Selection for the Staff College

All officers must qualify at an examination. Before he is allowed to present himself for examination an officer must be recommended as a thoroughly good regimental officer and likely to make a staff officer.

At the examination a certain number of vacancies are filled by direct competition; the remainder are filled by nomination from among those who have qualified.

The number of vacancies each year is about 60, and the number of candidates has been as high as 700.

An officer is allowed to present himself for examination three times, but the maximum age is 35 (minimum 27).

The average age of students on joining is about 32.

In order to maintain a suitable representation of the various arms the number of competitive vacancies allotted to each arm is limited, and the proportion can be further adjusted in selecting officers for entrance by nomination.

A definite number of places are reserved for officers of the Indian Army and from the Dominion forces. These officers must, however, pass the qualifying examination.

Two officers of the Royal Navy and two officers of the Royal Air Force are admitted each year.

Establishments

The total establishment of students is 120, about 60 passing out each year.

The staff consists of—

The commandant assisted by the adjutant for administration.

Instructors.

Two general staff officers, first grade, one in charge of each division.

Fourteen general staff officers, second grade, seven to each division.

Of the second-grade instructors—

Two must be artillery

One must be engineers

One must be cavalry

One must be Indian Army

One must be Royal Air Force.

Each general staff officer, second grade, has a special subject for which he is responsible, but each takes his share in the general work of instruction.

Final Reports on Students

An individual report on the qualification of each student when he leaves is submitted by the commandant, and students are classified and placed in an approximate order of merit.

This order of merit is based on a rough system of marking the student's day-to-day work weighed by the opinion of the staff of the officer's personality and character.

No examination to determine the order of merit is held.

The order of merit and the final report are used as a guide to placing officers in appointments suitably. It establishes no claim.

General Notes

Officers are encouraged to keep themselves physically fit and are given many opportunities for recreation.

A special feature is the "drag" hunt which serves as a recreation and a means of improving riding.

Pressure is seldom necessary to make officers work hard; in fact the tendency is sometimes to overwork. Much of the work is done in the officers' own time, and lectures are seldom given for more than two hours in any one day.

Once an officer is admitted into the Staff College he is rarely discarded.

The standard attained by students of course varies greatly but practically all can be usefully employed on the staff.

Conclusions

The system gives very good results, but it depends on the careful selection of candidates and on the keenness and loyalty of the students. The main incentive to work is that students know that their career will depend on the work they can produce as a result of what they have learned rather than on the opinion formed of them while they are learning. Students are of sufficient age and experience to realize this.

CIVILIAN LECTURER ATTACHED TO STAFF AT SANDHURST

During the past year a civilian lecturer has been attached to the staff at Sandhurst (the British West Point), for the purpose of delivering weekly lectures on current international affairs. The cadets are reported as taking great interest in these lectures. Incidentially, one of the recent lectures was devoted to the subject of the London Naval Conference and why the British wanted 6-inch instead of 8-inch guns; the reason advanced was that, on account of ammunition supply, the 6-inch gun was the largest gun that could be manhandled; the question of gun foundation apparently was considered of secondary importance.

JAPAN

NOTES ON JAPANESE 10,000-TON CRUISER "NACHI"

The following observations are reported as a result of a recent visit on board the Japanese 10,000-ton cruiser *Nachi*, laid down in 1924 and commissioned in 1928:

Main battery consists of ten 8-inch guns mounted in pairs in turrets, three turrets forward and two turrets aft. The maximum elevation of these guns was carefully estimated to be 35 per cent. A reliable observer reports that the *Myoko* and one other ship of this class have their turret tops cut back from the turret face a distance of 3½ to 4 feet, thus probably doubling the elevation noted above. The observer definitely stated that the turret tops of the *Nachi* were not cut back but added that he had reliable information that the *Myoko's* turret tops were cut back as noted. The 8-inch guns appeared small and light for naval guns of that caliber and power.

Antiaircraft battery consists of six 4.7-inch 50 caliber guns mounted three on each side between the mainmast and the bridge.

Torpedo armament consists of twelve 21-inch above water torpedo tubes arranged in four sets of triple tubes; two sets of triple tubes on each side. All torpedo tubes are located in the torpedo room, a space about 60 by 60 feet on the second deck abaft the after stack and over the forward engine room. The two sets of tubes on a side are separated by a distance of about 30 feet fore and aft. It was not definitely ascertained whether the torpedo tubes were capable of train or not, but apparently the tubes are run out over the side through ports which appeared too small to admit of train of the tubes, hence fixed tube fire is probably used. The torpedo tube ports are closed by sliding doors moving on rollers.

Aircraft.—At the time of the inspection no aircraft or catapult was on board. However, subsequent observations have established the fact that a catapult is installed between the mainmast and the after high turret.

Chemical warfare.—No gas masks or lockers for gas masks stowage were seen. No special gas-tight doors or other gas-tight fittings were noted, nor did any special precautions against gas seem to have been taken.

Armor.—The sides of the ship are protected by a 2 to 3 inch belt of armor extending from below the water line to the second deck and fore and aft to just forwards of the forward turret and to just aft of the after turret. The second deck is a 1¼-inch armored deck extending from side to side. The third deck in the immediate vicinity of the turrets is a 1¼-inch armored deck. The turret trunks are

not armored; the turret fronts are of 3-inch armor; the tops and sides are of thin ½ to 1 inch armor plate. The torpedo room has no armor protection, being protected only by the main deck and the side plating. The funnel uptakes are protected by 3-inch armor to a height of about 3 feet above the second deck.

Fire control.—There are two main-battery fire-control stations; one in the foretop and one aft just abaft the mainmast. There is only one director which is located in the foretop. There are two small antiaircraft fire-control stations; one on each side just inboard and abreast the center gun of the antiaircraft battery. There is also a platform which runs athwartships just forward of the mainmast which is apparently used in connection with antiaircraft fire control.

Range-finders.—In addition to the usual equipment of range finders around the bridges, etc., a range finder is installed in each turret. These turret range finders are 20 feet or more in length.

Searchlights.—There are three 36-inch searchlights; one on each side of the mainmast, and one located on the center line between the stacks. There are two signal searchlights; one being located on each wing of the bridge.

Fuel capacity.—Normal 2,400 tons of oil; maximum 3,200 tons of oil.

General notes.—The ship is very apparently built with the object of getting the best combination of gun power and protection possible for the limiting displacement and desired speed, perhaps at the expense of habitability according to United States standards. The ship seems to lack comforts for the crew necessary for service in tropical waters, and perhaps some of the sea keeping qualities of the British 8-inch gun 10,000-ton cruisers. The construction in many places is light, the turrets particularly being small and of light construction. The upper bulkheads are light and the bulkheads below deck have very few openings for water-tight doors. Aluminum alloy is used extensively for fittings. There are very few ventilators and no boat davits, the boats being handled with the one boom located abaft the mainmast.

Defect in living quarters.—A subsequent Japanese press report states that during the recent training cruise of the Second Fleet to the South Sea Islands serious defects were revealed in the construction of the living quarters of the crew of the 10,000-ton cruisers of the *Nachi* class. These defects, it is said, were caused by giving first consideration to superior fighting power at the expense of comfort and living conditions. A study of the health and condition of the crew of the 10,000-ton cruisers which made the cruise revealed the following facts:

(*a*) On account of heat crew were obliged to sleep on the decks at night.

(*b*) Few could properly perform their duties at their battle stations when ports were closed.

(*c*) With the exception of radiomen, every one was found to have lost weight.

(*d*) Space is sufficient for 100 additional men, which additional personnel would be required in time of war.

The above discoveries are said to be engaging the serious attention of the naval authorities with a view to correcting these defects in the four 10,000-ton cruisers now under construction.

JAPANESE GRAND NAVAL MANEUVERS, 1930

Grand naval maneuvers will be held along the length of Japan's coast, from Kyushu to Hokkaido, from October 7 to 26, on the largest scale undertaken in the past four years. The navy will expend 4,000,000 yen (about $2,000,000) for the maneuvers which are designed particularly to reveal the deficiencies caused by the London limitations. Particular attention will, therefore, be paid to aircraft.

The emperor will leave Tokyo on October 17 to board the warship *Kirishima* at Yokosuka and will proceed to the maneuvers, which he will attend from October 20 to 24. He will review the fleet at Kobe on the 26th.

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FRANCE

PERSONNEL STRENGTH OF FRENCH NAVY

A recent capitulation of the personnel strength of the French Navy indicates the following:

Officers	3, 909
Enlisted men	58, 508
Total	62, 417

The officer strength includes line, warrant, engineer, supply, medical and pharmaceutical, naval constructors, civil engineers, ordnance engineers, hydrographic engineers, and 43 reserve officers at sea for two years studying for permanent commissions. It also includes all commissioned officers on duty at shore aviation stations, or at the Air Ministry, who are actually paid by that department. It does not include naval officers assigned to coast-defense duties.

The enlisted strength includes men in the navy, at air stations ashore under the authority of the Air Ministry, naval police, and certain other forces that perform duties now performed in our Navy by sailors or marines. It does not include men assigned to duty with the coast-defense forces.

There are no marines in the French Navy. Duties performed by certain of our marines afloat and ashore are, in the French Navy, performed by *fusiliers marins;* i. e., specially trained sailors. The work done by our marines at the marine barracks, Quantico; marine barracks, Philadelphia; Parris Island; marine base, San Diego; marine barracks, Guam; marine barracks, St. Thomas; marine forces, Haiti; marine detachment, China; and marine forces, Nicaragua, is in France done by the French Army.

The number of enlisted men given above is therefore comparable to the total number of enlisted men in the United States Navy plus certain marines. It is impossible to make a more accurate comparison.

Voluntary enlistments in the French Navy are for 3, 4, or 5 years, reenlistments for 1 to 3 years. Conscripts serve for 1 year. *Inscrits maritimes* serve for 33 months.

Recently the recruiting service of the French Navy was composed of 9 line officers, 6 warrant officers, and 90 retired enlisted men. In the year 1929 this force of 105 officers and men recruited 17,800 men.

There are 4,125 reserve officers and 75,000 reserve enlisted men in the French Navy.

FLIGHTS OF FOREIGN AIRPLANES OVER FRENCH TERRITORY

The following copy of a letter addressed to the United States Embassy at Paris, by the French Minister of Foreign Affairs, relative to flights of foreign airplanes over French territory, but which does not apply to aircraft from visiting naval vessels flying in the vicinity of their ships, has been received and is quoted for information:

FRENCH REPUBLIC

MINISTER OF FOREIGN AFFAIRS

PARIS, FRANCE, *March 20, 1929.*

The attention of the Minister of Foreign Affairs has been called to the fact that when permission is requested for flights of foreign airplanes over French territory all necessary data is not furnished.

This results in unnecessary correspondence, and delay in taking action.

The Minister of Foreign Affairs would be obliged if the United States Embassy would furnish, as far as possible, the following data in connection with future flights:

1. Airplane: Type of airplane (mark, indicate whether civil or military), type of motor, license number.

2. Crew: Names of members of crew giving ranks if attached to military service.

3. Itinerary: Point of departure and final destination; indication of general route to be followed while passing over French territory, as well as proposed landings.

4. Objects carried: Radio outfit, moving-picture machines, cameras, arms, and munitions.
5. Supplies: If assistance of French authorit'es is demanded.
6. Approximate date of departure.

EMBASSY OF THE UNITED STATES OF AMERICA,
Paris, France.

REGULATIONS GOVERNING VISITS OF FOREIGN MEN-OF-WAR TO FRENCH PORTS AND PROTECTORATES, AND FRENCH COLONIES

The following decrees govern the visits of foreign men-of-war to French waters and Protectorates, revised to June, 1930:

Article	French ports and protectorates	French colonies
1	Under reservations as set forth in present decree, men-of-war of foreign countries at peace with France are, as the general rule, permitted to anchor in ports comprised in the maritime sectors hereafter determined, as well as in territorial waters at a distance of 6 miles from low-water point. (*a*) Coast of France: Channel sector, comprising the coast line from the Belgian frontier to Brest. Atlantic Ocean sector, comprising the coast line, including islands, from Brest to Spanish frontier. Mediterranean sector, comprising the coast line, including the islands of Corsica, from Spanish frontier to Italian frontier. (*b*) North African sector, comprising the coast line of Algeria and Tunisia, as well as Morocco, both on the Mediterranean and Atlantic Ocean side, the Spanish and Tangier zone included therein. (*c*) Levant sector, comprising the coast line of the territories of Syria and the Grand Liban, placed under the Protectorate of France. In any 1 sector the number of foreign men-of-war of the same flag can not, without special authorization, exceed 3 in number.	Under reservations as set forth in the present decree, men-of-war of foreign countries at peace with France are, as a general rule, permitted to anchor in ports comprised in the maritime sectors hereafter determined, as well as in territorial waters at a distance of 6 miles from low-water point, of Colonial ports, and Protectorates of France coming under the Minister of Colonies. (*a*) Sector of Indo-China and French dependencies in the Indies. (*b*) Sector of Madagascar, dependencies and islands attached to La Reunion. (*c*) Sector of occidental French Africa and the Togo. (*d*) Sector of equatorial French Africa at the Cameroun. (*e*) Sector of the Antilles and la Guyane. (*f*) Sector of Saint-Pierre and Miquelon. (*g*) Sector of French dependencies in the Oceanic. (*h*) Sector of New Caledonia and dependencies. (*i*) Sector of the French Coast of Somalis. In any 1 sector the number of foreign men-of-war of the same flag can not, without special authorization, exceed 3 for first 4 sectors indicated above, and 2 for the other 5 sectors mentioned.
2	Within the meaning of this decree, the term "men-of-war" comprises all ships and auxiliaries inscribed in the official list of vessels of war of a nation whose government is recognized by France.	Within the meaning of this decree, the term "men-of-war" comprises all ships and auxiliaries inscribed in the official list of vessels of war of a nation whose government is recognized by France.
3	All proposed visits of foreign men-of-war to waters mentioned in the maritime sectors specified in art. 1, should be notified to the Minister of Foreign Affairs at Paris, via diplomatic channels, at least 7 days before the arrival of the ships, unless in case of emergency. The notification will mention if the vessel visiting carries airplanes.	All proposed visits of foreign men-of-war to waters mentioned in the maritime sectors specified in art. 1, should be notified to the Minister of Foreign Affairs at Paris, via diplomatic channels, at least 15 days before the arrival of the ships, unless in case of emergency. The notification will mention if the vessel visiting carries airplanes. The Minister of Foreign Affairs will notify without delay the Minister of Colonies who will notify the governor general or commissaire of the Republic representing the Government in the territory in question.

Article	French ports and protectorates	French colonies
4	Submarines can only enter territorial waters sailing on the surface. All diving by submarines is prohibited.	Submarines can only enter territorial waters sailing on the surface. All diving by submarines is prohibited.
5	The dispositions of the present decree are only applicable to airplanes when carried or towed by men-of-war; these airplanes should not leave territorial waters by the air without special authorization from competent French naval authority.	The dispositions of the present decree are only applicable to airplanes when carried or towed by men-of-war; these airplanes should not leave territorial waters by the air without special authorization from competent French naval authority.
6	Foreign men-of-war flying the same flag can not, without special authorization from the President of the Republic, remain more than 15 days in any maritime sectors specified in art. 1. They are obliged to take to sea within 6 hours after receiving due notice from competent naval, military, or civil authority.	Foreign men-of-war flying the same flag can not, without special authorization from the President of the Republic, remain more than 15 days in any military sector specified in art. 1. They are obliged to take to sea within 6 hours after receiving due notice from competent naval, military, or civil authority.
7	The dispositions of arts. 1 and 6 are not applicable to the following men-of-war: (*a*) Ships on board which are embarked Chiefs of State, members of reigning dynasties, or their staffs, or diplomatic representatives accredited to the Government of the French Republic. (*b*) Ships in port due to accidents, heavy weather, or other emergencies. (*c*) Vessels under the Department of Fisheries acting in conformity with international conventions relative to fishing.	The dispositions of arts. 1 and 6 are not applicable to the following men-of-war: (*a*) Ships on board which are embarked Chiefs of State, members of reigning dynasties, or their staffs, or diplomatic representatives accredited to the Government of the French Republic. (*b*) Ships in port due to accidents, heavy weather, or other emergencies. (*c*) Vessels under the Department of Fisheries acting in conformity with international conventions relative to fishing.
8	In the principal military ports of the district, where there is a commandant, only the prefect maritime, or the commandant, are qualified to assign anchorages to foreign men-of-war as well as changes of anchorage. In other ports, this right belongs to the captain of the port or port officer. Should there not be a captain of the port, or a port officer, this right belongs to the senior officer present of French men-of-war present in the roads. In ports where there is neither a captain of the port, a port officer, nor a French senior officer present, the right belongs to the military commandant or to the senior civil official.	In the principal military ports of the district, where there is a commandant, only the prefect maritime, or the commandant, are qualified to assign anchorages to foreign men-of-war as well as change of anchorage. In other ports, this right belongs to the captain of the port, or port officer. Should there not be a captain of the port, or a port officer, this right belongs to the senior officer present of French men-of-war present in the roads.
9	As soon as a foreign man-of-war arrives in the principal port of the region, the prefect maritime will send an officer to salute the commanding officer, obtain his name and object of visit, as well as all other necessary information. In military and commercial ports, headquarters, headquarters of a commandant of the Navy, the visit will be made by an officer under his command. In commercial ports where a commandant of the Navy is not assigned, the visit shall be made by the administrator of the inscription maritime or his delegates.	As soon as a foreign man-of-war arrives in the principal port of the region, the prefect maritime will send an officer to salute the commanding officer, obtain his name and object of visit, as well as all other necessary information. In other ports, the visit shall be made by an officer of the port.

Article	French ports and protectorates	French colonies
10	In territorial waters, and different ports specified in art. 1, foreign men-of-war are forbidden to conduct salvaging operations, take soundings, or to carry on, without special permission, military exercises (landing parties), firing, torpedo practice, mine laying, etc. They must respect the French fiscal laws and conform to the rules of the sanitary police as well as to the port regulations governing French ships, and it shall be the duty of the authority mentioned in art. 8 to inform them of these matters. Members of the crew must be without arms when they go ashore. Officers and petty officers may carry such arms as form part of their regulation uniform. The number of men granted liberty, as well as the hours of liberty, shall be arranged by an understanding between the commanding officer of the vessel and the civil authorities mentioned in art. 8. If funeral honors must be rendered on shore by a detachment from the ship, the commanding officer of the vessel will demand authorization from the commanding officer of the district. Boats from ships, which circulate in waters, must not be armed.	In territorial waters, and different ports specified in art. 1, foreign men-of-war are forbidden to conduct salvaging operations, take soundings, or to carry on, without special permission, military exercises (landing parties), firing, torpedo practice, mine laying, etc. They must respect the French fiscal laws and conform to the rules of the sanitary police as well as to the port regulations governing French ships, and it shall be the duty of the authority mentioned in art. 8 to inform them of these matters. Members of the crew must be without arms when they go ashore. Officers and petty officers may carry such arms as form part of their regulation uniform. The number of men granted liberty, as well as the hours of liberty, shall be arranged by an understanding between the commanding officer of the vessel and the French Government representative on shore, or his delegate, after consultation with the military authorities. If funeral honors must be rendered on shore by a detachment from the ship, the commanding officer of the vessel will demand authorization from the senior military or civil official on shore. Boats from ships, which circulate in waters, must not be armed.
11	A sentence of death can not be carried out by any foreign man-of-war anchored in territorial waters or sectors mentioned in art. 1.	A sentence of death can not be carried out by any foreign man-of-war anchored in territorial waters or sectors mentioned in art. 1.
12	In case of war between foreign powers, France being neutral, the conditions of access and sojourn of ships of the belligerents are regulated by instructions set forth in decrees of Oct. 18 and 26, 1912; however, the formalities of notification, or previous authorization, set forth in arts. 3 and 10 of this decree are applicable.	In case of war between foreign powers, France being neutral, the conditions of access and sojourn of ships of the belligerents are regulated by instructions set forth in decrees of Oct. 18 and 26, 1912; however, the formalities of notification, or previous authorization, set forth in arts. 3 and 10 of this decree are applicable.
13	In case a visiting ship does not conform to the conditions of this decree, the local naval or military authority should invite the attention of the commanding officer to such failure and request him to observe the regulations laid down herein. If this procedure does not bring the required results, said authority shall request the ship to put to sea as prescribed in art. 6.	In case a visiting ship does not conform to the conditions of this decree, the local naval or military authority should invite the attention of the commanding officer to such failure and request him to observe the regulations laid down herein. If this procedure does not bring the required results, said authority shall request the ship to put to sea as prescribed in art. 6.
14	This present decree cancels the decree of May 21, 1913, regulating visits of foreign men-of-war to French waters and to French protectorates.	The decree of August 20, 1913, rendering applicable to the colonies the decree of May 21, 1913, relative to visits of foreign men-of-war to territorial waters, as well as all orders contrary to the present decree, are hereby repealed.

Article	French ports and protectorates	French colonies
15	This decree will be published in the Journal Officiel as well as in the Official Bulletin of the Navy and the Official Bulletin of the Ministry of Public Works. The decree takes effect as soon as published in the Journal Officiel.	The present decree will be published in the Journal Officiel and in the Bulletin of the Minister of Colonies and Minister of Marine.
16	The Minister of Marine, Minister of Foreign Affairs, and the Minister of Public Works, in so far as it concerns their respective departments, are charged with the execution of this decree.	The Minister of the Colonies, Minister of Foreign Affairs, and Minister of Marine are charged, in so far as it concerns their respective departments, with the execution of this decree.

ITALY

ITALIAN OPINION RESPECTING AIRCRAFT CARRIERS

Recently several articles have appeared in the Italian press discussing the relative advantages to be derived by the inclusion of aircraft carriers in the Italian fleet. Referring to the peculiar position of Italy in the Mediterranean some articles have stressed the advantages that would be gained by the fleet should Italy possess aircraft carriers. Other articles have argued that Italy in herself is to all intents and purposes an immense airdrome in the middle of the Mediterranean and does not need carriers to ensure the presence of aircraft at probable scenes of action.

The present Minister of Aeronautics is understood to be of the opinion that on account of her relative position in Europe, especially in the Mediterranean, Italy does not need aircraft carriers. The Italian Navy, however, is understood to be in favor of the idea of adding aircraft carriers to the Italian fleet, and considers that there is probability of an aircraft carrier being included in the 1931–32 building program.

JAPANESE GOVERNMENTAL ORGANIZATION

*(Note: The following notes on governmental organization in Japan are published as of possible interest in connection with discussion now proceeding in that country relative to ratification of the London Naval Treaty.—*Ed.*)*

The principal factors in the constitutional machinery of Japan are the Emperor, the Privy Council, the Cabinet, the Imperial Diet, the electorate, the political parties, and the genro or elder statesmen, which last is now practically one of historic interest. Their legal status and actual powers, and their relations to each other may be briefly described as follows:

THE EMPEROR

The legal status of the Emperor under the constitution, if properly interpreted, does not differ much from that of any constitutional monarch, but his influence over the masses of the people in Japan is extraordinary and without parallel. Prince Ito, the chief framer of the constitution, expounds the constitutional status of the Emperor with a certain coloring of popular sentiments: " The sovereign power of reigning over and governing the State is inherited by the Emperor from his ancestors, and by him bequeathed to his posterity. All the different legislative as well as executive powers of State, by means of which he reigns over the country and governs the people, are united in the most Exalted Personage, who holds in his hands, as it were, all the ramifying threads of the political life of the country, just as the brain in the human body is the primitive source of all mental activity manifested through the four limbs and different parts of the body." Thus in theory the Emperor is absolute, and the masses of the people in Japan believe him to be sacred and inviolable according to the letter of the constitution. But in reality he acts only by the advice of the Prime Minister and occasionally by that of the elder statesmen. And constitutionally he is inviolable in the sense that " he can do no wrong." In fact, the power he actually exercises in practical politics is by no means greater than that of the King of England, though his influence, owing to the peculiar psychology of the people, is no doubt far greater than that of the British Crown, and plays the predominant part in Japanese politics.

In England, even the masses possess knowledge enough to be aware that for whatever the King does or says the Premier is responsible,

whereas, in Japan the words of the Minister President, if put into the mouth of the Emperor, become the words of the Emperor, himself, thus investing them with a greater weight and dignity. They become the supreme authority of the land. Therefore, it not seldom happens that the Minister President of Japan, when affairs are at a deadlock, tries by means of the name of the Emperor to evade his responsibility, or to overcome a strong opposition of the people to the Government, with the object of maintaining his office. It must be stated at the same time that such autocratic practices are no longer tolerated by the public opinion which has become distinctly democratic since the manhood suffrage.

THE PRIVY COUNCIL

Next to the Emperor, the Privy Council in Japan occupies a peculiar position in the constitutional system of her government. It is not like the Privy Council of England, out of which the British cabinet system has grown, and in which the cabinet ministers have their legal existence. The cabinet and the Privy Council in Japan form two separate and independent institutions.

The functions of the Privy Council are chiefly of a consultative nature. It meets to deliberate on any important matter of state, when its opinion is asked for by the Emperor, and advises him according to its lights. The principal matters on which it is usually consulted are those which come under the jurisdiction of the Imperial House Law, all important legislation relating to articles of the constitution, the issuing of proclamations of the law of siege and of Imperial ordinances and all the matters relating to international treaties and pledges.

The power of the Privy Council is entirely of a negative nature; nevertheless it exercises a very strong power and influence in Japanese politics. It consists of 26 members with its own president and vice president. They are all veteran statesmen who have played very important parts in the administration, and though no longer taking an active share in it, their age and prestige entitle them to universal respect. As may be expected they are extremely conservative in their political ideas and sentiments.

All such important acts of legislation as relating to rights and liberties of the people are usually submitted to the Privy Council before the Government introduces them to the Imperial Diet. The Privy Council is at liberty to reject them or to delay their passage. Of course, it is as the Emperor pleases either to accept or reject this decision, but it may easily be seen how great is the influence which the Privy Council can exercise on all such legislation by virtue of its deliberative function. Sometimes the cabinet uses the powers

of the Privy Council as a convenient expedient for killing measures it does not really desire to bring into the Diet. On the other hand it sometimes happens that the Privy Council prevents the passage of some important measures of the Government. But the Privy Council can not meet on its own account, its meetings being called by the Emperor on the advice of the Minister President. All the cabinet ministers have seats, in the council ex officio, and, therefore, it is the will of the cabinet that ultimately prevails, and not that of the Privy Council.

As to international treaties and pledges, the Privy Council is always consulted, and it is the only deliberative body in the constitutional system of Japan that can freely discuss all the foreign policies of a government with the cabinet, though its meetings are kept absolutely secret.

The most important power of the Privy Council is that of interpreting the constitution. In 1927 and 1928 three important cases were submitted to the approval of the Privy Council. The disapproval of the Wakatsuki Government's Bank of Taiwan rescue measure in April, 1927, on constitutional grounds caused its fall, while a similar proposal made by the succeeding cabinet and the peace preservation emergency ordinance proposed in July, 1928, by the same cabinet were both passed.

THE CABINET

Nowhere in the constitution of Japan is the word "cabinet" mentioned. Yet there exists as a matter of fact a collective body of all departmental ministers under the presidency of a Minister President, somewhat like the council of ministers in Belgium or the British Cabinet, for the purpose of initiating, determining, or carrying out the general schemes and policies of the Government. Though this collective body known as the "Naikaku" meets to discuss and determine under the guidance of the Minister President how the Imperial Government is to be carried on in all important matters of state and how to advise the Emperor, yet is has no joint responsibility as the British Cabinet has, that is to say, each cabinet minister is not responsible for the action of the cabinet as a whole nor the cabinet as a whole for the action of each minister.

As chief executive organ of the state, the cabinet exercises all powers executive, legislative, and judicial, which are invested in the Crown by the constitution; that is to say, the issuing of administrative and emergency ordinances, the making of treaties with foreign nations, the declaring of peace and war, etc., all of which falling

within the executive function of government are virtually controlled by the cabinet in the name of the Emperor.

In Japan, the cabinet ministers, unlike those of England, are not always party men; they may hold their office independent of the House of Representatives. The representative system of government has not yet developed in this country to such a stage as to make the cabinet ministers necessarily responsible to the Diet.

A certain ordinance provides that the Minister of War must be but a general or lieutenant general, and the Minister for the Navy, an admiral or vice admiral, and because of this ordinance it was found impossible on one occasion to organize a cabinet as ordered by the Emperor because there was no suitable admiral willing to become the Minister for the Navy in the cabinet. On another occasion the ministry in power was forced to go out of office because of the strong demand of military men to add two divisions to the army.

But the above instances are unusual, and as a matter of fact, those days are now passed, owing to the steady development of peace movement.

THE IMPERIAL DIET

The Imperial Diet is bicameral, consisting of a House of Peers and a House of Representatives. The former is composed of princes of the blood, ordinary princes, and marquises who sit by virtue of their right; representatives of counts, viscounts, and barons; imperial nominees, and representatives of the highest taxpayers.

With regard to legislative matters, all rights and powers granted to the Diet by the constitution are equally granted to both houses, except that the budget is to be brought in first in the House of Representatives. Thus the two houses are supposed to be coordinate, neither the one nor the other being considered superior or subordinate. But it is not so in practical politics. Where there are two chambers in a legislature, naturally the one or the other becomes predominant.

Although, as far as outward appearances go, the members of the House of Peers occupy a better fortified position, for the House of Peers is not subject to dissolution, as the House of Representatives is, yet in practice it is not the former, but the latter, that the cabinet regards with greater dread, holding it more aggressive and powerful and more difficult to control. The fact is that 125 imperial nominees in the House of Peers are mostly ex-officials of government, who hold their position in a life tenure, while the rest are aristocratic either by birth or by wealth. Hence their natural sympathy is always with the cabinet ministers independent of and irresponsible to the House of Representatives.

In the House of Peers there are no political parties, so to speak; nevertheless all its members are of political leaning, either for or against the cabinet of the day. This political activity is especially strong among the younger and ambitious members of the house.

In the House of Representatives there are very clear-cut divisions; and no matter how many parties there are, the house is usually divided into two camps, the Government party and the opposition, though this party division does not come from any political principle or conviction. Of late things have become more complicated in the house owing to the absence of a party commanding absolute majority and to the maneuver engineered by minor party men to snatch an opportunity of casting votes.

The lower house has the power of initiative in all matters of legislation, but its legislative power is rather negative in character, for in Japan a majority of the House of Representatives does not necessarily control the cabinet. It is the cabinet that gets its majority by one way or other. When a political party in Japan supports the Government, it is because its leader is the Prime Minister or holds a certain portfolio in the cabinet. Then again some parties or individual members too often give support to the Government from consideration of interest, while, on the other hand, the Government can sometimes force them to support its policies either by intimidation or through threat of dissolution.

The cabinet ministers in Japan do not therefore formulate the policies of State in accordance with the political programs which the parties supporting the Government may have laid down at the time of their election. It may even be said that the political parties in Japan have no definite programs, nor make no promises before election. They know well that they can not make their promises good, even if they made them. The cabinet ministers have practically an entirely free hand to formulate all policies of State, and even the Government party usually accepts almost blindly whatever the cabinet decides. Too often the Government party is merely a convenient tool to the cabinet for carrying its measures through the House of Representatives.

THE ELECTORAL SYSTEM

The election law in Japan has a separate existence from the constitution; and that is very fortunate for her, revision having been effected already, three times solely on account of this convenient arrangement. The constitution, on the other hand, is a formidable document that does not easily allow modification.

UPPER HOUSE REFORM

Simultaneously with the adoption of the general manhood suffrage bill in the fiftieth session (1924–25) of the Diet the reform of the upper house was effected, though naturally more limited than that of the other house. The main points in the reform are as follows:

The age limit for the members of the order of prince and marquise was raised to 30 years from 25 years.

The number of the members of the lower order has been fixed at 18 for counts, 66 for viscounts, and 66 for barons.

The inclusion of four representatives of the members of the Imperial Academy to be elected from among the members thereof by mutual election.

The highest taxpaying members in the house shall be elected from among those paying direct national tax to the amount of 300 yen and upward in connection with landed property, industry or commerce, the age limit for such members being fixed as 40 years and upward. The number of such members for each prefecture is limited to 1 or 2, according to the size of population, the total number not exceeding 66.

The application of the penal clauses of the election law, hitherto exclusively applied to the election of the members of the lower house, to the election of the highest taxpaying members.

The cancellation of the seventh article of the law of the houses providing that the number of the imperial nominees and highest taxpaying members in the upper house shall not exceed the number of the titled members.

The period of the examination of the budget by the upper house committee is limited to within 21 days as in the case of the lower house committee.

THE GENRO

The "genro" or so-called elder statesmen as a body has no constitutional status, but as surviving builders of the grand work of the imperial rehabilitation half a century ago the council of genro was, until the beginning of 1922, an important institution in the political system of Japan, though with functions not legally formulated. It then consisted of four elder statesmen, Marshal Prince Yamagata, Prince Saionji, Marquis Matsukata, and Marquis Okuma.

DEFENSE OF PORTS

(By Maj. B. C. Dening, Royal Engineers)

(Note: A British thesis on the threefold aspect of the defense of ports, stressing "coordination" as the keynote. Awarded first prize and published in the Army Quarterly, London, July, 1930. ED.)

INTRODUCTION

It is accepted that the existence of the British Empire in war is dependent on the control of sea communications. The security of the ports constituting the terminal points of these communications is, therefore, of vital importance. These ports, which may be either naval or commercial, may be subjected to attacks by sea, air, or land, either singly or combined. Consequently the defense of ports has a threefold aspect.

In any scheme of defense some knowledge of the form of attack to be expected is required before any plan of defense can be framed. In this article, therefore, consideration will first be given to the scale of attack which is likely to be made upon ports before discussing the aspects of defense.

A port, from the point of view of attack or defense, is a vague expression. In every port there is a "vital area" which gives importance to that port. The area may consist of indispensable dockyards, safe anchorages, or perhaps of landing facilities for essential supplies. Whatever the reason for the importance of the area, it is this "vital area" which has to be considered both in the attack and the defense of ports, rather than the port as a whole.[1]

THE SCALE OF ATTACK TO WHICH PORTS ARE EXPOSED

Attacks may be considered under the headings of: (*a*) Sea attack; (*b*) air attack; (*c*) land attack; (*d*) the threefold attack.

(*a*) *Sea attack.*—The scale of sea attack to which a port may be exposed is governed by: (i) The naval situation of the day; (ii) the types of vessels in use; and (iii) the location of the port vis-a-vis possible enemies.

(i) *The naval situation of the day.*—The naval situation of the day decides whether the command of the seas, by which the port in

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[1] The truth of this statement is emphasized in the history of the siege of Port Arthur. The "vital area" in that case was an anchorage giving shelter to the Russian battle fleet, which fleet, as long as it remained intact, was able to influence the war to a large extent. Though the port as a whole was invested and bombarded, and fort after fort was taken, it was not until direct observation was obtained for artillery on to this "vital area" that the attack succeeded and the defense failed.

question is approached, lies in friendly or hostile hands. If the enemy possesses this command he is free to attack a port at any time and with the whole of his maritime strength. The scale of defense in that case must be very different from that required when the defender of the port possesses naval predominance. In the latter case defense provision need only be made for attacks in the nature of raids, limited probably both as regards time and strength.

The ports of the British Empire vary in the degree to which they are exposed to naval attack. Some, close to the home waters of the British main fleet, are comparatively immune from sea attack. Others, thousands of miles from such protection, may be subjected to the maximum scale.

(ii) *The types of vessel in use.*—Since the great war, and particularly since the Washington treaty of 1921, the numbers of battleships in the world have been so reduced, and, in consequence, such store is set by their safety, that the battleship can be ruled out in considering the type of attack to be made upon most ports. Only very rarely will a nation allow one of its battleships to stand off and bombard a port, however important the latter may be. The risks to such a vessel from torpedo, mine, or aerial bomb would be too great. It seems likely, therefore, that the standard 10,000-ton cruiser, with its 8-inch armament, is likely to provide the greatest danger in sea attack upon ports. In addition to bombardment by such ships, sea attack upon ports may be delivered by submarines, destroyers, or coastal motor boats firing torpedoes or shell, or by block ships sent in to block some passage.

(iii) *The location of the port vis-a-vis possible enemies.*—The distance of the port to be defended from possible hostile naval bases affects considerably the scale of sea attack. A port in close proximity to an enemy, such as the Belgian ports were to Great Britain in the great war, may be liable to attack by monitors. Others, farther afield, will be free probably from attack except by ocean cruisers and ocean-going submarines.

It is evident that the conditions in the case of every defended port need to be examined with regard to the above-mentioned factors (i), (ii), and (iii), and a scale of sea attack deduced from them.

(*b*) *Air attack.*—A port may be liable to two forms of air attack; e. g. (i) attack by land-based aircraft; and (ii) attack by sea-borne aircraft.

As regards (i), a port known to be within the range [2] of land-based aircraft may be subjected to heavy bombing attack, both by day and by night. It may be denied the use of the air and be blinded in

[2] This range is increasing from year to year with improvements in aircraft design. Perhaps to-day 300 miles may be taken as the limit of land-based air attack.

its defense operations. It may be forced to suffer the effects of ship bombardment directed by aerial observation. Aircraft may lay smoke screens behind which a hostile bombarding fleet can approach safely to decisive ranges. At the least, the port is certain to be reconnoitered from the air and photographed.

As regards (ii), by reason of the limit set to the numbers of aircraft that can be carried at sea, and of the difficulties experienced in maintaining, repairing, and replacing them, the attack from sea-borne aircraft is far less to be feared than that from land-based machines.[3]

The same types of action as given above and anticipated for land-based aircraft may be expected from sea-borne machines, but in lesser degree. In addition, some sea-borne aircraft may fire torpedoes at close ranges.

Aircraft are carried at sea, not only by carriers but also upon many cruisers and even by submarines. In war, therefore, it is unlikely that any port will be certain of immunity from attack by hostile aircraft.

In the case of ports liable to sea-borne attack only, the freedom of movement and the possible bases of hostile vessels, particularly carriers, have considerable bearing upon the problem.

For any port, again, a scale of air attack can be forecasted by a study of the conditions.

(*c*) *Land attack.*—Where the security of the "vital area" of a port can not be threatened by sea or air attack (these being the readier methods), land attack may be resorted to by an enemy. Such attack is again divisible into two types: (i) The land-based attack and (ii) the sea-borne attack.

As regards (i), where the territory in which a port is situated has a common frontier with a possible enemy, the port may be attacked by large land forces, the degree of the attack depending only on the degree of importance attached by the enemy to the port and to the strength of his army.[4]

Where (ii), a sea-borne attack, is concerned, the degree of attack depends entirely upon the naval and air situation. Without command of the sea and the air in the neighborhood of the port only very limited attacks are likely.[5] With such command, protracted

[3] At the same time it is interesting to record that in 1929, according to the American press, during naval maneuvers in the region of the Panama Canal, extensive and effective attacks upon the "vital area" of the Canal Zone (viz. the lock gates), are considered to have been delivered by the sea-borne aircraft of the United States Pacific Fleet.

[4] Port Arthur again provides an example. Here the port was attacked from the landward side by extensive Japanese forces. The siege of Sebastopol offers a similar example.

[5] The ports of eastern England were prepared for such attacks from Germany in the late war.

and successive landings may be undertaken, though even under such conditions of transportation limit the size of forces employed.[6]

To-day, when considering the scale of land attack upon a port, the possibility of the attack employing armored forces should be specially examined.

In the case of all ports, an estimate of the degree of land attack likely can be formed.

(*d*) *The threefold attack.*—So far the separate possibilities of sea, air, and land attack have been enumerated. It must not be forgotten that, to be effective, all three fighting services may be employed by the enemy simultaneously, utilizing one or more of their methods of attack, to overcome the defense of a port. Where a succession of attacks by different fighting services may be defeated in turn, a combined attack may prove successful.[7]

THE THREEFOLD ASPECT OF THE DEFENSE OF PORTS

The defense of ports can be conveniently considered under the headings of: (*a*) Sea defense; (*b*) air defense; (*c*) land defense; (*d*) the threefold aspect of defense.

(*a*) *Sea defense.*—The defense against attack by sea can be calculated once the probable scale of attack for the particular port has been estimated on the lines already indicated.

Assuming that a port has been shown as liable to all forms of sea attack, the basis of the defense will be that for the prevention of close bombardment. There are two schools of thought in the matter of how to provide the best defense against ship bombardment. The older school advocates the well-proven system of fixed land guns, firing with greater accuracy than the guns of the ships to which they are opposed by virtue of their stationary pedestals, aided by every known instrument, including the spotting airplane, and protected by earthworks and camouflage. A younger school points to the capital tied up in fixed armament, to the fact that much of the defensive power built in round a port will never, throughout its life, be called into use, and would wish the main defense of a port to be provided by bombing aircraft. On the financial side it is impossible to put forward decisive arguments one way or the other, for while the relative cost of a battery of guns of a certain caliber and of a squadron aircraft of a certain type can be stated, it is as yet not feasible to equate the accuracy, the hitting power, and the effect of these forms of weapon. It is idle to suggest the substitution of one weapon for another, whatever the

[6] The British Army attack upon the Dardanelles was a case of this type.

[7] The Dardanelles were attacked in 1915, twice by the navy and later by the army. Had these attacks coincided possibly a different result might have been attained.

financial advantage, until the strength of the substituted weapon is shown equal to its task.

It would seem that a final judgment between these two schools of thought will not be given until after the next great war, for in the last one the real possibilities of air attack were not fully tested. For the present it would appear safer to adhere to the method of defense in use in the past which is known to be effective, for though aircraft have sunk ships it has not yet been done under fire. Further, one of the chief claims for the substitution of aircraft for fixed armament; e. g., that the defensive power in that case is mobile, that it can be retained in central reserve and not prematurely deployed and tied down, is also one of its greatest dangers, for under the stress of perhaps world-wide difficulties it is not unlikely that the aircraft required could not be spared at the critical moment for allotment to the port in question. There would always be the temptation to use such aircraft for other purposes. By adopting aircraft in place of fixed armament a definite risk would be taken as regards the safety of a port. Possibly the greatest attribute of fixed defenses is that they are fixed and can not, under the passing whim of politician or strategist, be moved for illegitimate tasks.

If these arguments are acceptable, the main defense of a port will still consist of batteries of guns. The caliber of these is dependent upon the range of the expected opposition. Generally the caliber of the gun on shore can afford to be less than that of the ship gun, in view of the advantages which the shore gun possesses in matters of stability, protection, concealment, height above sea level, and ammunition supply. Where possible, the shore guns should be sited so as to deny the enemy any chance of bombarding the "vital area" of the port. In view of the aid which bombarding ships can obtain from spotting aircraft, it is no longer sufficient merely to deny the enemy observation from his ships upon the "vital area." While the defense is likely to possess aircraft also, and the value to it of aircraft capable of denying to the enemy the use of his aircraft observation is very apparent, unfortunately, in order to insure that the enemy would never be able to use aircraft observation, a prohibitive number of aircraft would need to be tied up in the defense of ports. For this reason, though adequate defense aircraft may be hoped for, shore-gun calibers must be sufficiently large to keep bombarding ships at a range at which little damage to the "vital area" can be done even with aircraft observation.

Since the great war, an additional problem has been presented in the defense of a port by the introduction of the smoke cloud as a cover for bombarding ships. Aircraft or destroyers can to-day lay a screen of smoke which completely cuts out observation on to approaching ships from the ground or shore. Under such cover ships

can approach within close range of a "vital area" and, with aircraft observation, their fire might well prove decisive. It is obvious that the best means of combating this form of attack is by the use of aircraft, which can either drive hostile spotting machines off the target and render the bombardment blind or can themselves observe through the smoke cloud on behalf of the land guns. It is possible, though difficult, for ships to be so shrouded that observation of them from overhead is denied as well as from the flank. Such a cloud is likely, however, to be thin over the ships and it is probable that, if the defense aircraft are powerful enough to be able to maintain position over ships firing behind a smoke screen, sufficient observation will be obtained to make the ships' position untenable.

Another method which the defense may employ under these circumstances is to take advantage of the concealment offered by the smoke and to send out auxiliary naval craft, particularly submarines and torpedo airplanes, with which the bombarding vessels can be attacked.

The use of smoke by attacking vessels also suggests the employment of similar tactics by the defense. A judiciously controlled smoke cloud thrown across the "vital area" at the right moment might completely nullify the effect of air observation on the part of the attack. At least it would force hostile observation aircraft to come right over their target in order to observe effectively and place them more at the mercy of the air defense of the port.

The problem thus offered by the introduction of smoke, while it complicates matters, is seen to be by no means insoluble as far as the defense is concerned. At the same time it is clear that its solution rests very largely upon the relative strength in aircraft of the attack and defense.

In addition to the main gun defense, if the remaining forms of sea attack are anticipated—e. g., close in attack by submarines, destroyers, coastal motor boats and block ships—the port requires a ring of quick-firing gun defenses, aided by searchlights and possibly by boom obstacles, mine fields, submarines, and other naval small craft.

(*b*). *Air defense.*—Defense against air attack is provided normally by one or more of the following means: (i) Single-seater fighter squadrons; (ii) day or night bombing squadrons; (iii) antiaircraft gun defenses, aided by sound locators and searchlights; and (iv) balloon defenses.

Whether aircraft squadrons are likely to be allotted solely for the defense of a port or not will depend upon a number of factors of which the principal are the national importance of the "vital area" in question, the number of aircraft available and the probable scale of attack.

It may be assumed, for obvious reasons, that the higher air commanders will be very loath to deploy even a portion of their resources as permanent air garrisons of ports. Where the defense of the port in the air can be included in a larger air defense scheme, such as, for example, the air defense of the Thames Port in the air defense scheme of London, certainly there is no call for the detachment of squadrons for special port defense duty. In a port far removed from the main air force reserves, however, each case must be treated upon its merits. It is necessary to appreciate what may happen in the defense of a port if that port is deprived of aircraft. Obviously, a port of any importance should have its own defense aircraft, the numbers depending upon the probable scale of attack.[8]

Apart from aircraft, since it has been shown that every port throughout the world is liable to a degree of air attack, every port should possess a corresponding degree of antiaircraft gun defenses, sound locators, and searchlights. As in the case of aircraft, the amount of defense that can be provided is limited mainly by considerations of cost. According to the scale of attack expected, ports should be provided with antiaircraft guns mounted in such a manner as to form a network over the "vital area" of the port. In addition, where there are vessels in port, some additional antiaircraft action may be expected from ships' antiaircraft guns and searchlights. Such defenses will at least force an enemy's aircraft to keep to such a height that the effect of their bombing or reconnaissance is less lightly to be dangerous. In certain cases where a "vital area" is of great importance and much exposed to air attack by night, balloon curtains may be employed.

Where fighter aircraft are given to the defense, it is essential, in order that such aircraft can attain a height from which the enemy's aircraft can be advantageously dealt with, that as early warning as possible be obtained of the approach of hostile machines. In the case of the majority of ports, this problem presents much difficulty, especially if the air attack comes straight off the sea. Assuming the defense aircraft require 30 minutes' warning, with the attack approaching at 100 miles per hour, the warning posts would need to be 50 miles away from the "vital area" in the direction of the attack. Further, by flying inland at a point away from the port, hostile aircraft may approach from any point of the compass. This points to the necessity for surrounding the "vital area," where its location permits and where the scale of attack and the importance of the "vital area" justify such steps, with a ring of observation

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[8] In this connection it is interesting to note that in the defense forces of their overseas bases of Panama, Hawaii, and the Philippines, the United States include fighting, bombing, and reconnaissance squadrons of aircraft.

posts connected up to the central antiaircraft defense headquarters by telephone.

(*c*) *Land defense.*—The land defense of a port will be provided by a military garrison and by suitably sited defense works. The size of garrison and the nature of the defense works will be determinable in each port by a study of the scale of attack.

If a land-based attack is possible, it may be necessary to hold defensive lines at such a distance that *effective* gun fire can not be brought to bear upon the "vital area," not overlooking the fact that hostile guns will fire with aircraft observation. The extreme range of modern guns may make it impossible to keep the "vital area" out of range. It will be essential, then, by means of the antiaircraft defense to keep hostile artillery observation machines at a distance.

In the cases where only a sea-borne land force need be feared, all forts and defensive points liable to surprise attacks require obstacles around them and small local garrisons. As far as possible all feasible landing places within striking distance will need to be defended usually by means of obstacles across the exits to the beaches and below the low-tide level, and by prepared defense positions to be held in emergency.[9] These fixed field defenses require the support of a mobile garrison. A sound system of roads and a reserve of mechanical transport enable the size of mobile force needed to be considerably reduced, for a landing party, if met early enough, can be defeated by a far smaller force than is necessary after the landing has been safely effected. Similarly, a mobile naval or air force capable of attacking the landing craft can reduce considerably the size of the land force to be maintained.

Against the chance of attack by armored fighting vehicles, whether from a land base or landed from the sea, the relative possibilities of the use of land mines, antitank gun defenses, and mobile antitank weapons in the shape of other armored fighting vehicles should be examined. The nature of the approaches will largely govern the choice, also the fact that armored fighting vehicles, like aircraft, are scarce and are not generally best employed tied up in the defense of a particular area.

(*d*) *The threefold aspect of defense.*—To consider the defense functions, respectively, of the sea, air, and land defense forces, each, by itself, is relatively simple. To obtain a picture of the threefold defense working as one whole is less easy.

In order to obtain this picture, let the occasions upon which one fighting service is dependent for success upon the cooperation of an-

[9] At the Dardanelles the Turks defended the likely landing beaches in this manner. It is interesting to note that here the important landing places were many miles away from the "vital area" in question, which was the narrows of the Straits.

other be enumerated. First, for successful sea defense it has been shown that in some cases land guns, aircraft, searchlights, booms, mine fields, submarines, and other naval craft must work together. Second, against air attack, aircraft, ground guns, searchlights, sound locators, observation systems, balloon obstacles, and the help of naval craft, both by antiaircraft fire and by keeping the sea-based aircraft at a distance, are shown to be necessary. Third, in defense against land attack, again aircraft, land forces of all arms, and the aid of naval vessels may be required.

If, then, a combined sea, air, and land attack by the enemy on the "vital area" of a port be visualized, from the above it is apparent that there will be many various and simultaneous calls upon all of the defense forces and that, if the rôle of each of the three fighting services is not clearly laid down and an efficient system of coordination and control evolved, hopeless confusion is likely to result, followed by a failure of the defense.

THE RÔLE OF THE THREE FIGHTING SERVICES

(*a*) *The Navy.*—The rôle of the navy in the defense of ports is, first, strategic, to provide that threat of counterattack at sea which keeps the scale of attack within reasonable limits. The larger ships providing this threat may be based far away from the port in question or may be ensconced within it. Their location should not be influenced in the average case by the defense needs of a particular port, for such influence restricts the freedom of strategic movement of a mobile weapon. But their existence somewhere is undoubtedly a factor of first importance in the defense of any port.

Second, the navy provides the port in question with the smaller craft necessary for local defense at sea. These consist variously of destroyers, sloops, gunboats, submarines, and coastal motor boats. Their chief duty is the performance of such reconnaissance as can not be carried out by aircraft, particularly by night or in thick weather. Submarines may be required to force larger hostile vessels both to keep at a distance and in motion. In addition, naval craft are needed to engage similar hostile craft in conjunction with the defense aircraft and land gun defenses, and, in the case of vessels possessing antiaircraft equipment, to cooperate with the land antiaircraft units.

Finally, the navy will lay any mine fields required and superintend the erection of boom obstacles where necessary.

In all the forms of employment of the navy, the need for close coordination of the action of the navy, army, and air force is to be noted. In its strategic rôle, the question arises of the aid which air forces can give. In the local defense of the port, without close

coordination, friendly naval craft may be mistaken for the enemy or some of the defense vessels may mask the fire of the land guns. Some gap may even be left, either on the water or in the air, not covered by any fighting service, each under the impression that some other service is taking action.

(*b*) *The Air Force.*—In the strategic aspect of the defense of a port, the air force will have as its principal rôle the task of long-distance reconnaissance, employing generally long-range airplanes, but also, on occasion, airships.[10] In certain circumstances it is conceivable that land-based aircraft may be able to influence the movements of hostile fleets or transports by the direct threat of bombing attack, particularly where such vessels have to pass through narrow waters.

In the local defense of a port, the duties of the air force are, first, to provide reconnaissance over sea and land; second, if in sufficient strength, to deny the air to hostile machines; third, to provide observation aircraft to conduct the fire of long-range batteries; and, fourth, to carry out direct attack, by bomb or torpedo, upon important targets, such as a hostile capital ship.

The need for coordination of the tasks of the services is again noticeable. In the strategic field the navy and air force have similar duties; in the local defense these services again combine in reconnaissance, in hunting submarines, and in keeping large ships at a distance. The army and air force are employed together in long-range bombardment and in reconnaissance on the landward side. All three services combine in measures against hostile aircraft.

(*c*) *The Army.*—The rôle of the army has already been mainly indicated in the previous paragraphs. Strategically, the army has importance only where a port of the landward side is exposed to large-scale attack. The army may then be called upon either to keep the enemy at a distance from the objective or, in the form of a relieving force, to raise the siege from the landward side.[11]

In the close defense of the port, the army has primarily to provide local protection to the forts containing the long-range weapons, and to any defensive posts exposed to attack by landing parties. It must also be prepared to defend possible landing places and to beat off attacks by armored forces. In addition, the army mans the shore guns and lights for defense against sea attack and air attack. It finds the sound locator, air observations, and sign systems, and probably erects a balloon curtain if used.

In every one of its duties, again, the work of the army needs coordinating with that of the other services.

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[10] Germany in the Great War employed Zeppelins for reconnaissances of the North Sea.

[11] The strategic rôle of an army is again well illustrated in the defense of Port Arthur. Here one Russian army endeavored to keep the landward attack at distance, while a second fought to attempt the relief of the port.

THE CONTROL AND COORDINATION OF THE DEFENSE

(*a*) *Strategic control and coordination.*—In the strategic defense of a port, control and coordination, while of greater importance even than in the local defense, should not, generally, be as difficult to insure as in the local defense in that the problems usually are of outstanding magnitude and there is more time for their consideration.[12]

The strategic use of armed forces in defense of a port affects the strategy of the whole empire. It is obvious, therefore, that control and coordination in this case must be exercised by the central command of the armed forces of the empire, presumably the war cabinet and its functions with regard to the control and coordination of the fighting services is outside the scope of this article, in that it involves many issues unconnected with port defense. It will suffice to record that on strategic points, the defense of a port will be governed by instructions from a central imperial authority which should provide for control and coordination.

(*b*) *Control and coordination in the local defense.*

(i) *Control.*—Control in the fighting services raises the question of the system of command in a port. Obviously, with a defense force comprising elements of three services and with sea, air, and land defense problems requiring coordinating a supreme port commander is necessary. Secondly, the threefold nature of the defense indicates the need for a sea defense commander and a land defense commander.

The supreme port commander.—Whether the supreme port commander is a sailor, airman, or soldier is relatively unimportant, though it is essential that the selected officer have a considerable knowledge of all three services. It would appear reasonable that the command of the port should normally be vested in a member of that service which predominates in the defense of the port. This will generally mean that the supreme port commander is an army officer, though should a large naval or air force be stationed at a port for its defense this might not be the case.[13]

The supreme port commander should be, of course, entirely independent—as far as port defense is concerned—of the commander of any large naval, military, or air force that happened to be utilizing that port as a base for operations elsewhere.

The sea-defense commander.—The sea-defense commander will obviously be the senior naval officer and his command will normally

[12] That the question of strategic coordination can be overlooked is apparent from the history of the attack on the Dardanelles by the Allies in 1915.

[13] In Port Arthur the Russian Army consisted of 41,000 officers and men and the navy of between 8,000 and 9,000. The fleet was, however, of considerable size and importance The supreme commander then was an army officer, Lieutenant General Stessel. (See Official History of Russo-Japanese War.)

consist of all the units of his service. In addition, since it is desirable to have one officer only responsible for all sea-defense operations, he should also control aircraft working with the navy; e. g., sea-reconnaissance machines, fleet spotters, and perhaps torpedo planes. He will be responsible also for mine fields and harbor obstructions.

The air-defense commander.—Where there is an appreciable air force in the port, the air-defense commander would be the senior air force officer. Otherwise, he would be the senior army antiaircraft artillery officer.

This commander would control all units formed for air-defense purposes; e. g., any fighter squadrons, army antiaircraft guns, searchlights, observers, sound locators, and perhaps balloon curtains. Here, according to circumstances, army units may be placed under an air force officer or air force units under an army officer.

The land-defense commander.—This commander will be the senior army officer, and he commands all army units except those allotted to the air-defense commander. He should also control the aircraft used by him for the observation of the fire of the land guns, whether seaward or landward.

The above allocation of control of the various commanders has been indicated either by common sense or by experience in the past. There are, however, certain points with reference to this division of control which require further consideration.

There is first the question of the use of bombing squadrons where such are allotted to a port. Where the port in question is within reach of land-based air attack, the principal task of bombing squadrons is the destruction of opposing aircraft by bombing them in their hangars. In such a case their command should obviously rest with the air-defense commander. But, where no such attack is possible, it is open to question whether the bombers should not come under control of the sea-defense commander, since their principal rôle will become the attack of hostile vessels, in conjunction with other naval measures. The airman's objection to such a transfer of control is that the naval commander may not possess the technical knowledge as to the limitations and possibilities of air bombers necessary to insure proper use of this weapon. The writer is, however, of opinion that in this case bombing squadrons should come under the sea-defense commander, for otherwise two independent commanders will be operating with only that amount of coordination which the supreme port commander can supply against the same objective. The problem of the best means of dealing with hostile vessels outside the range of land guns is, after all, essentially a naval one.

Next there is the existing anomaly with regard to the control of the land guns and searchlights operating seaward. These weapons

are employed entirely on sea-defense duties and in theory should be commanded by the sea-defense commander. In practice they are under the senior army officer, who is the land-defense commander. This problem is not quite the same as that presented by the air bomber working with the navy, for the duties of the seaward land guns and lights are quite distinct from those of friendly naval craft operating within the range of the land guns. Nevertheless, the closest cooperation is necessary between the land guns and lights and the naval forces, for otherwise, as stated earlier, friendly craft may be mistaken for the enemy or may mask the fire of the land guns. There is no doubt that there would be a gain in efficiency in certain respects were the sea-defense commander to have control also of army weapons used in sea defense, but in order to do so naval officers would be required to have a technical knowledge of army methods and equipment which few could be expected to possess. In other words, what gain there might be from unified control here over units acting together in seaward defense would be more than offset by a loss in efficiency resulting from a naval officer attempting to manage an intricate military organization. For this reason, the anomaly is likely to remain in the future, though here, it is clear, is one of the cases where it is necessary to insure coordination.

The third point which is not clear is the question of the control of the antiaircraft equipment of naval vessels, particularly while in port. Here again, in theory, the naval antiaircraft guns and lights should be under the orders of the air-defense commander, for in air defense in particular it is essential that no gap should be left in the protection provided and that the weapons of one service should not confuse or overlap those of another. But in practice the stumbling block is again the different methods employed in different services for the performance of a given task. In this instance the army-trained antiaircraft gunner officer, who under the air-defense commander would be in charge of the antiaircraft ground weapons, would not normally be familiar with naval methods of fire control. For this reason it seems the naval and military antiaircraft systems must continue under separate control, but coordinated as far as possible.

(ii) *Coordination.*—The chief problems calling for coordination appear from the preceding pages to be those arising out of the use of: (*a*) Alternative means of reconnaissance; e. g., aircraft or vessels at sea and aircraft or ground forces on land; (*b*) alternative means of action against hostile vessels; e. g., aircraft, naval vessels, or land guns; and (*c*) alternative means of action against hostile aircraft; e. g., counterattack by bombers or single-seater fighters, by the antiaircraft equipment of ships or by the military air-defense units.

As a first step toward close coordination, a system of command (as already indicated and as summarized in table attached) by which there is a judicious allotment of units, whatever their service, to the most suitable commanders, before any action by the enemy is experienced, makes it less likely that the defense will suffer from lack of cooperation between the services. By this means units of different services can train together and gradually forget that they belong to different services.

Mixed staffs.—To obtain a further measure of coordination, it is suggested that where possible members of other services should serve on the staffs of the various commanders. The supreme port commander should have a staff officer from each service, while the sea, air, and land defense commanders should each have a staff officer from the other two services. It is necessary that these officers should be appointed as executive staff officers; i.e., as those who prepare the commanders' battle orders, etc., rather than as liaison officers.

CONCLUSION

(*a*) *The main problems in port defense.*—It has been indicated in the preceding pages that the main problems to be solved to-day in the defense of ports are: (i) The land gun and air bomber question, with reference to the most effective, cheapest, and safest method of defense against bombarding fleets; (ii) the problem of the use of smoke, both by attack and the defense and its dependence upon aircraft; (iii) the possibility of the allotment of aircraft to ports; (iv) the alternative claims of the air force and navy, respectively, for the control of bombing squadrons; and (v) the question of whether the air force or the army should be responsible for air defense.

It is noticeable that in all these problems the air force is affected, and that the difficulty lies generally between the air force and one of the older services and not between the older services. This is easily accounted for by the fact that a *modus vivendi* between the older services has been evolved from the experiences of several centuries of cooperation in port defense. A crop of difficult problems is only to be expected with the advent of a new service, introducing another dimension, another element and various new weapons.

Of the five problems summarized above, the third, the problem of the allotment of aircraft to ports, is by far the most important. For the others, with the passage of time, solutions will be found and, for the present, the absence of a solution is not vital. But in the question of the allocation of air units as a permanent garrison of ports in peace important principles are involved. From the central, imperial, air force commander's point of view, the detachment of aircraft to ports contravenes the principles of concentration

and economy of force. From the point of view of the supreme port commander, their absence violates the principle of security. This question should be regarded undoubtedly from a wide angle and the good of the empire considered as a whole, as represented in the security of its ports. As has been pointed out earlier, the absence of aircraft in a port may have serious consequences. The test of whether a port should have aircraft, just as whether it should have naval or military defense forces, should be whether the port can be expected to hold out without aircraft. If it can, their detachment is unsound in view of the general shortage of aircraft for all purposes. On the other hand, if machines are necessary, early recognition of the fact will be a great advantage in view of what is involved in the provision of airdromes and ground preparation, apart from the squadrons themselves.

It is certain that no answer to these outstanding problems can be obtained when they are approached in any partisan spirit. Only by honest trial and experiment will sound results be obtained. While on the one hand, wild claims for a new weapon are to be deprecated, at the same time it is to be remembered that from time immemorial mankind has been absurdly conservative and new possibilities should be fairly examined. What is needed is that all down the grades of the services thought should be in terms of the combined services and not in terms of any one service. With such a state of affairs, the difficulties in port defense should be overcome.

(*b*) *The lesson of the Dardanelles.*—The most recent and instructive case of the defense of a port is that of the Dardanelles. This defense is particularly interesting in that the defenders were subjected to nearly every form of attack to which a port is liable except extensive air attack. It will be profitable, therefore, to record why the defense succeeded and why, in places, it nearly failed.

The chief reason for the success of the defense it seems was that the defenders obtained sufficient warning of each stage of the attack to take adequate steps to frustrate it.[14]

While allowance must be made for the fact that Gen. Liman von Saunders in his book is painting a picture of excellence as far as the actions of the German Military Mission were concerned, it does appear from this account of the operations that the defense were, on the occasion of each attack, ready for eventualities. Before the attempts by the navy to force the Straits, that possibility seems to have been considered by the defense and steps were taken to meet it. Before the landings by the army, it is certain that the German

[14] See Fünf Fahre Turkei, by General der Kavallerie Liman von Saunders, pp. 64–76. (*Note: Five years in Turkey.—Von Saunders. Published by U. S. Naval Institute. Ed.*)

commander received considerable information of the general plan of attack if not of the details.

The occasions upon which the attack (in these cases landing operations) nearly succeeded were those upon which an element of surprise was introduced. This in the original landing and the later landing at Suvla Bay success came to the parties which came ashore at the unexpected places. The fact that the Turks were not more often surprised is the more remarkable in that, compared to later standards, the port defense included very inadequate facilities for air reconnaissance.

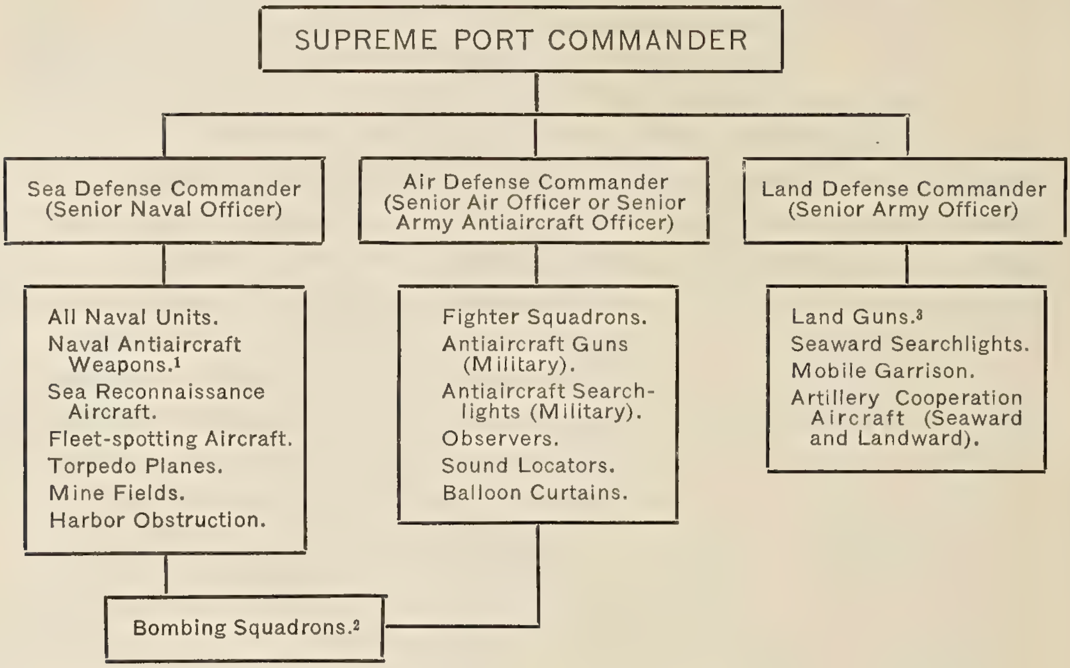
Apart from the question of surprise, the Dardanelles operations showed the great natural advantages which the defense possesses over the attack. The combined attacks of considerable British and French naval forces were demonstrated as unequal to the task of overcoming the relatively out-of-date Turkish land forts. The prodigious efforts of the Allied armies were also proved to be unavailing against an organized defense.

The lesson of the Dardanelles, therefore, is that the principal task in arranging the defense of a port is to provide against surprise. In practice this involves the sufficient provision of reconnaissance aircraft and naval craft, arrangements for watching all the adjacent coasts, even the seemingly inaccessible, and a system of communications by which warning and orders to defense units can be rapidly conveyed.

(*c*) *Preparations in peace.*—At a time when general disarmament is hoped for, when funds are very short, it is difficult to suggest steps necessary to place the defense of ports in a more satisfactory state. Certain measures costing very little have, however, been discussed in this article. These include the correct allotment of rôles to the fighting services, methods of control that will insure coordination, peace training that will guarantee the cooperation of the different services under the stress of battle, and the arrangements mentioned above by which adequate warning will be obtained. Such measures can be immediately taken.

As regards the steps which involve either the provision of funds or a display of distrust against some particular foreign power, these to-day must no doubt be held in abeyance. But the order of priority of tasks to be carried out at the many ports of the empire should be clearly established, and such preliminary arrangements made as will make certain that, on the clouding of any particular horizon, there shall be no delay in the reinforcement of the defenses, whether it be by aircraft, ships, or men or by an increase in the fixed defenses.

TABLE SHOWING SYSTEM OF CONTROL AND COORDINATION



[1] While in port, are closely coordinated with action by Air Defense Commander.
[2] Undersea or Air Defense Commander, according to primary rôle.
[3] Action closely coordinated with that of Sea Defense Commander.

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ASST. F. C. OFFICER			
COMMUNICATION OFFICER			
MEDICAL OFFICER			
SUPPLY OFFICER			
FIRST DIVISION OFFICER			
SECOND DIVISION OFFICER			
THIRD DIVISION OFFICER			
FOURTH DIVISION OFFICER			
FIFTH DIVISION OFFICER			
SIXTH DIVISION OFFICER			
MARINE OFFICER			
"V" DIVISION OFFICER			
"A" DIVISION OFFICER			
"B" DIVISION OFFICER			
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"M" DIVISION OFFICER			
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RADIO OFFICER			

CONTENTS

GENERAL NAVAL NOTES

BRITISH EMPIRE

BULBOUS BOW FOR BRITISH LIGHT CRUISER "LEANDER"

It is understood that, following a series of Haslar tank experiments, the British Admiralty are considering the adoption of the *bulbous bow* for the light cruiser *Leander*, the only cruiser in the 1929 building program, laid down in September, 1930, at the Devonport Dockyard. The form of bulbous bow adopted is said to be a conservative one, of general pear-shaped section, somewhat similar to the extreme forward sections in our own more recent battleships.

FOREIGN AIRCRAFT NOT PERMITTED TO FLY OVER SOUTHAMPTON-PORTSMOUTH AREA

In connection with a recent visit of one of our light cruisers to Southampton, England, it has been ascertained that the British authorities do not approve of flights being made by foreign aircraft—including those attached to visiting naval vessels—over the Southampton-Portsmouth area, owing to the extensive fortifications contained in that area. It is understood that such restrictions do not apply to some of the unfortified ports, such as Edinburgh.

RESTORATION OF WEIHAIWEI TO CHINA

As a result of a convention between the British and the Chinese Nationalist Government, concluded at Nanking on April 18, 1930, and ratified by both Governments, the British restored Weihaiwei to China on October 1, 1930.

The convention provides that the return to the Chinese Republic of the territory of Weihaiwei, the abrogation of the lease of the territory concluded on July 1, 1898, the withdrawal of the British garrison within a month of the coming into force of the convention, the handing over to the Chinese Government of archives, registers, title deeds, and other documents as may be useful for the transfer of the administrative lands and buildings, works, the Chefoo-Weihaiwei cable, Government stores, and the civil hospitals, such transfers to take place on the coming into force of the convention.

The National Chinese Government on its part agrees to maintain existing regulations, including land and house tax, sanitary and building regulations, and policing, as far as possible; to recognize the validity of title deeds, mortgages issued to Chinese owners by the British administration, unless the documents of title are contrary to Chinese law, making revision or issue of additional documents of title necessary. All documents of title issued to persons other than Chinese are to be exchanged for Chinese deeds of perpetual lease and all leases issued by the British administration to be recognized by the Chinese Government.

In case the Chinese Government desires to close part of Weihaiwei to foreign residence and trade, with the view to using the port as a naval base, the interests of foreign property owners and leaseholders shall be bought out at a fair compensation, a joint commission being appointed to determine the amount of compensation in each case. Should the Chinese Government decide not to reserve the port exclusively as a naval base, it will maintain it as an area for international residence and trade; also it will lease to the United Kingdom free of charge for 30 years, with the option of renewal by the holders, certain lands and buildings in the territory of Weihaiwei for the requirements of the British consulate and the public interests of the residents. Existing aids to navigation, such as lighthouses, storm signals, etc., are to be transferred free of charge to China, and will be maintained in the future by competent Chinese officials, who are to administer the harbor as an open port.

Wei-hai-wei, China

The Chinese Government undertakes to maintain the existing public services, employing such staff as it might select, particularly the telephone and telegraph services. All decisions of the Weihaiwei high court and magistrates are to have the same force and effect as if they were decisions rendered by the Chinese courts.

In an agreement attached to the convention the Chinese Government agrees to lend for a period of 10 years to the British Govern-

ment a certain number of buildings and facilities on the island of Linkungtao as a sanatorium and summer resort for the British Navy. Provision is also made for the use from April to October (inclusive) by the British Navy of a portion of the anchorage dredged by the British Navy, and for landing men for drill and rifle practice.

BRITISH NAVAL MISSIONS

At present (October, 1930) British naval missions are assigned to Chile, China, and Greece, some descriptive details of which follow:

Chile.—The official designation of the body of British naval officers on duty with the Chilean Government is "the British naval advisory staff." Their duties are advisory only, and members have no commission in the Chilean Navy. This advisory staff, consisting at present of 10 officers (1 captain, 3 commanders, 3 lieutenant commanders, 2 lieutenants, and 1 squadron leader, air corps), functions through the Chilean general staff. Except for the chief of the advisory staff, who has the rank of captain, all of the British officers are given a rank one grade higher in the Chilean Navy than that held in their own service. It is understood that, for reasons of precedence, it was decided not to increase the rank of the chief of the advisory staff (a captain) to that of rear admiral, since many of the officers of the Chilean Navy who hold responsible positions are comparatively junior in rank. For example, the present chief of the Chilean general staff is a captain in the navy. The designations and headquarters of the various members of the British advisory staff follow:

Designation of duties	Headquarters
Chief of staff	Santiago.
Assistant chief of staff	Santiago.
Adviser for naval aviation	Quintero.
Adviser for submarines	Talcahuano.
Adviser for gunnery	Talcahuano.
Adviser for torpedoes	Talcahuano.
Adviser for engineering	Santiago,
Adviser for communications	Valparaiso.
Instructors (2), naval academy	Valparaiso.

Greece.—The contract covering the present British naval mission to Greece was signed at Athens on January 19, 1927. Members of the mission receive a Greek commission and hold office in the Hellenic Navy and wear Hellenic naval uniforms. The members of the mission are vested with administrative jurisdiction and executive authority under the provisions enforced on Greek naval officers by the Greek regulations.

Articles 1 and 2 of the contract read as follows:

ARTICLE 1

At the request of the Hellenic Government the British Government agrees to a naval mission proceeding to Greece, composed of officers of the British Royal Navy and Royal Air Force.

* * * * * * *

(*b*) The main object of this mission will be to perfect the fighting efficiency by promoting the training of the Hellenic Navy.

(*c*) If Greece is engaged in hostilities against another power or powers, the members of the mission can not be required to take part in any belligerent operations.

(*d*) In the event of hostilities between Greece and any other country, this contract will be terminated if either the Hellenic Government or the British Government require it.

ARTICLE 2

The duties of the mission are to organize and direct the training of the personnel. The mission is under the orders of a captain of the Royal British Navy with rank of captain in the Hellenic Navy, who is hereafter referred to as the head of the mission.

(*a*) The head of the mission will have direct access to the minister of marine and act as his adviser on all matters in connection with the mission and on any other matters as requested by the minister of marine.

(*b*) When required by the minister of marine the head of the mission will inspect any unit of the Hellenic fleet and any naval establishment.

(*c*) The members of the mission are invested with administrative jurisdiction and executive authority under the provisions in force for the Greek naval officers by the Greek regulations.

(*d*) The head of the mission will act as liaison between the mission, the British Admiralty, and His Majesty's Legation.

China.—On June 29, 1929, a contract was signed at Nanking between the British and Chinese Governments, for the assignment of a British naval mission to China, the signatories of the contract being Admiral Yang Shu-Chuang, minister of the Chinese Nationalist Government, and Sir Miles Lampson, British minister plenipotentiary to China.

Two officers of the British Navy are reported to have arrived in Nanking on May 27, 1930, to take up their work with the British mission. It is understood that, among other things, the following stipulations are contained in the contract:

The British Government agrees to a naval mission proceeding to China, composed of officers and ratings of the Royal Navy.

If China is engaged in hostilities against another power or powers, the members of the mission can not be required to take part in any belligerent operations.

In the event of hostilities between China and any other country this contract will be terminated if either the Chinese Government or the British Government require it.

The head of the mission will have direct access to the Minister of the Navy and act as his adviser on all matters connected with the mission and on any other matters as requested by the Minister of the Navy.

The members of the mission are vested with such degree of administrative jurisdiction and executive authority as is requisite for the proper execution of their duties under the provisions in force for the Chinese naval officers and under the Chinese regulations.

The head of the mission will act as liaison between the mission, the British Admiralty, and His Majesty's legation.

The original mission will be composed as follows:

One commander with the rank of captain in the Chinese Navy as head of the mission;

One lieutenant qualified in navigation with the rank of lieutenant commander in the Chinese Navy;

One warrant engineer;

One chief petty officer (gunner's mate);

One chief petty officer (telegraphist);

One ordnance artificer; and

One electrical artificer.

The personnel of the mission are placed at the disposal of the Chinese Government for a period of two years from the date of arrival at Shanghai or such other place in China as may become the headquarters of the mission.

The present contract can not be terminated before the expiration of two years from the date of coming into force except with the consent of both Governments.

All officers of the mission will receive a Chinese commission appointing them to the ranks which they are respectively to hold in the Chinese Navy and their names shall be entered in the official list of the Chinese Navy according to their seniority, which shall be senior to all Chinese officers of the same grade.

The officers of the mission will wear Chinese naval uniform during their period of service with the Chinese Government. The fact, however, of members of the mission being placed at the disposal of the Chinese Government and wearing Chinese uniform shall in no way prejudice their position as British subjects or as officers of the British Navy, and they shall continue to enjoy all the rights and privileges pertaining to their position as such during the whole of their period of service with the Chinese Government.

The ratings of the mission will wear British or Chinese naval uniform as may be arranged, and their position as British subjects

and as ratings in the British Navy is not affected in any way by their employment with the Chinese Government or by the fact that they may wear Chinese uniform.

One Chinese liaison officer and one aide-de-camp shall be attached to the head of the mission, the number of these officers being increased or reduced by agreement between the Minister of the Navy and the head of the mission.

The salaries of the members of the mission are a charge to the Chinese Government from the date the mission leaves England until the date of completion of leave after return to England, or if the member does not return to England on termination of his contract, until the date he would have completed his leave if he had so returned.

The annual emoluments are payable in advance to the members of the mission on the first day of each calendar month. The amounts are net and are subject to no reductions whatever for taxes.

The Chinese Government will pay the cost to China from England and to England from China of passages for the members of the mission, their wives, and children according to the following scale:

Officers: First-class accommodation.

Ratings: Second-class accommodation.

While in China the Chinese Government will refund direct to the members of the mission all reasonable traveling expenses incurred. Such traveling expenses include the cost of accommodation and passages when traveling on duty.

The Chinese Government hereby declare their intention in the near future to place substantial orders in Great Britain or Northern Ireland for the construction of ships for the Chinese Navy.

The Chinese Government pledges itself to keep secret such confidential matter as the British Admiralty or the head of the mission shall indicate.

No British officer or rating while in the service of the Chinese Government shall be called upon actively to take part in the suppression of disorder or rebellion.

It is agreed that the head of the mission to be appointed under the contract shall arrive in China on the 1st of October, 1930, and the dates of arrival of the other members of the mission shall be mutually arranged between the head of the mission and the Minister of the Navy.

At the request of the Chinese Government the British Government agrees to the following:

Twelve Chinese officers, ranking as cadets and midshipmen, will be received for training in the British Navy. These 12 officers will be about the age of 18, will have a fair education, be able to read

and write English, but will have had only small practice in the spoken language.

The officers referred to will complete one term at the Royal Naval College, Dartmouth, and three terms in H. M. S. *Erebus* or other cadet training ship and will then serve for 12 months in one of His Majesty's fleets. After completing sea training the officers will undergo technical courses for sublieutenant at the Royal Naval College, Greenwich. On completion of the technical courses for sublieutenant a number not exceeding four who have shown special aptitude (this number being increased if desired by mutual agreement) will complete a further year's training in His Majesty's fleet and will later qualify in either gunnery, signals and wireless telegraphy, engineering, torpedo, etc., as desired. The officers not selected for further training and specialization will return to China.

In addition to the officers referred to above, eight officers of the rank of sublieutenant will be received for training and will proceed direct to the Royal Naval College, Greenwich, and go through technical courses for sublieutenant. On the conclusion of technical courses these officers would serve for 12 months in one of His Majesty's fleets. After completing sea training the eight officers would qualify in either gunnery, torpedo, signals and wireless telegraphy, engineering, etc., as desired.

The eight officers referred to above would have some technical knowledge, a good general education, and a good knowledge of the English language except as regards practice in the spoken language. The officers will be about 21 years of age, except by mutual agreement in individual cases.

The officers while under training in His Majesty's navy will wear British naval uniform of their rank and will conform to such regulations and orders as are issued by the Admiralty or naval authorities for the guidance of British naval officers.

Officers may be withdrawn from service with His Majesty's navy at any time by mutual agreement, and the British Government reserves the right to request the withdrawal of any officer in case of unsuitability.

While actually serving in His Majesty's navy, Chinese officers will be entitled to free medical and hospital treatment by British naval medical officers.

The British Government are completely absolved from any liability in respect of accidents to or deaths of Chinese officers.

Traveling expenses of Chinese officers both to and from China and while serving with His Majesty's navy will be met by the Chinese Government.

For each of the 12 officers referred to above, the Chinese Government will pay to the British Admiralty a sum equivalent to £200 per annum during the period the officers are under training at the Royal Naval College, Dartmouth, or in a cadet training ship. This sum to cover all expenses, such as tuition, victualing, medical attention, etc., but not uniform or expenses while on leave during such time as the college or instructional establishment is closed.

For each of the 8 officers and for each of the 12 officers referred to above, after they leave the cadet training ship the Chinese Government will pay to the British Admiralty a sum to be agreed upon later, equivalent to the expenses of victualing and accommodation.

The Chinese Government will pay the cost of uniform for Chinese officers under training in His Majesty's navy.

The Chinese Government will remit to the British Government half yearly in advance a sum equivalent to six months' pay and allowances of the Chinese naval officers undergoing training. The officers will be paid monthly by the British Admiralty through the accountant officers of the ships in which they are serving. The British Admiralty will render to the Chinese Government a statement of each officer's account on completion of his course.

Egypt.—One British naval officer (engineer commander) is at present reported on duty in an advisory capacity with the Egyptian Government.

Finland.—It is reported that one British naval officer (commander) is on duty in an advisory capacity with the Government of Finland.

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JAPAN

JAPANESE CRUISER OILED AT SEA UNDERWAY AT NIGHT

The Japanese press recently reported that on August 29, 1930, in Hiroshima Bay, tests were conducted at night in fueling the cruiser *Ohi* (5,500 tons) from the tanker *Erimo* while both vessels were underway. The test was reported to have been successful. This is the first reported instance of Japanese vessels fueling at sea.

MODERNIZATION OF JAPANESE CAPITAL SHIPS

Work on the modernization of the *Kirishima* was started in April, 1927, and was completed in March, 1930. As a result of these alterations, including installation of blisters, the characteristics of this battleship were changed as follows:

Japanese Aircraft-Carrier "Kaga" (26,900 Standard Tons) Photographed, August, 1930

	Before alterations	After alterations
Beam ... feet	92	93
Standard displacement ... tons	26, 330	29, 330
Speed ... knots	27. 5	26
Torpedo tubes	8	4
Boilers	36	16

The battle cruiser *Kongo* is now in third reserve undergoing alterations. The appropriation for the current fiscal year is the final allotment for alterations to this vessel; apparently the work will be completed some time during this fiscal year.

The battle cruiser *Hiyei* was put in third reserve and modernization started in December, 1929, but as a result of the London treaty this work is said to have been discontinued.

The Japanese press recently reported that the new plans for national defense and plans for making up the losses in military strength resulting from the London treaty are now complete and provide for complete modernization of capital ships, especially to "increase angle of elevation of main battery guns and perfection of aviation installation on board."

PERSONNEL STRENGTH OF JAPANESE NAVY

The personnel strength of the Japanese Navy, as of June 30, 1930, is as follows:

Regular navy

Officers	7,820
Men	79,508
Total	87,328

(1) One hundred and ninety-two midshipmen and 553 naval cadets are not included in above figures.

(2) The budget for the fiscal year 1930–31 provides for 9,607 officers and 80,241 enlisted men. It is understood to be the common practice of the Japanese Navy to budget for considerable more officers than are actually carried in service; the additional funds thus obtained are available for other purposes.

The percentage of officers and men afloat is: Officers, 58; men, 51.

Duration of enlistments.—Petty officers, 6 years; volunteers, 5 years; conscripts, 3 years. There is also a special 2-year term of reenlistment.

Japan has no marine corps. Naval establishments are guarded by naval personnel. Part of the Naval Defense Corps (number unknown) are detailed for this duty. Total number assigned to Naval Defense Corps: 200 officers, 2,364 men.

Naval Reserves

	First and second reserve	Special reserve	Total
Officers	1,636	670	2,306
Special service officers, warrant officers	1,178	320	1,498
Petty officers and men	53,661	479	54,140
Total	56,475	1,469	57,944

NOTE.—Petty officers and men, both volunteers and conscripts who have completed their term of enlistment are transferred to the first reserve; after completing 4 years of service in the first reserve they are transferred to the second reserve for a period of 5 years, after which they are enrolled in the "landstrum" until they reach the age of 40 years.

The special reserve is composed of the merchant marine who are graduates of the merchant marine schools.

FRANCE

FRENCH CRUISER BUILDING PROGRAM

The 10,000-ton French cruiser *Dupleix*, of the 1928 program, is scheduled to be launched in October, 1930, 12 months after laying down of the keel; she will be the last of the six cruisers (*Duquesne*, *Tourville*, *Suffren*, *Colbert*, *Foch*, *Dupleix*) of that class to be completed. (For descriptive notes on *Colbert* see Office of Naval Intelligence BULLETIN, August, 1930.)

The six 10,000-ton cruisers of the later program have been named *Algerie*, *Madagascar*, *Maroc*, *Tunisie*, *Indo-Chine*, and *Senegal*. The first of these, the *Algerie*, will be laid down at Point du Zuor Cale, on the ways now occupied by *Dupleix*. The *Algerie* class will be more heavily armored than the *Suffren* class; will carry eight 8-inch guns and eight 4-inch antiaircraft guns; they will be flush deck, with one funnel, tripod foremost, and pole mainmast.

GERMAN NAVAL STRENGTH RELATED TO FRANCO-ITALIAN CONTROVERSY

The following British view of the present Franco-Italian controversy over naval building programs and in which German naval strength is assigned a leading rôle is taken from a recent issue of the London Naval and Military Record:

> That France is very much more concerned with the prospective restoration of Germany's naval strength than she is with any question of the present aspirations of Italy in the Mediterranean is pretty certain. Our own (British) pacifists, strong of faith in the adage that "sufficient unto the day is the evil thereof," are not troubling themselves about the prospective restoration of Germany's sea power in the smallest degree. It is true that when Germany is free to resume warship construction without any international treaty limitations she will have a tremendous amount of leeway to make up. But her shipbuilding resources are probably equal to those of any country in the

world. In proportion as we lessen the amount of leeway, she will have to make up in order to resume her former relative position with regard to our own navy, so shall we directly furnish her with an incentive to set her shipyards humming. That is to say, the more we reduce our own fleet by the time Germany is free to begin expanding her own fleet the more strenuously she is likely to apply herself to the task.

This is a long view, but wise naval policy must always take long views. It is the view that the French Ministry of Marine is taking, and which explains the resolute denial to modify any proposed naval construction except against a guaranty of security. It is all bosh to pretend that France wants any guaranty against the much smaller Italian Navy; she does not seriously contemplate any possibility of a conflict with Italy in spite of the lively interchange of epigrams with her vivacious neighbor. But Germany is a white horse of quite a different color. At the present time she is building the first of a squadron of six capital ships of such totally novel design that no other naval power in the world has any response to them. We are referring, of course, to the *Ersatz Preussen* type, the details of which are now very generally known. Cribbed, cabined, and confined as German naval designers are by the restrictions of the Versailles treaty of peace, they have produced a remarkable and extremely formidable design of warship within their limitations. And by this means they are actually, even if not apparently, lessening the degree of leeway the German Navy will have to make up when it starts to stretch forth again in unrestrained competition with the rest of the world.

If that steady, progressive disarmament about which our Socialist ministers are so fluent is to come, it must be unanimous among the great naval powers. We are told that "conversations" are still proceeding with France and Italy and that there is every hope that these countries will yet "come in." The United States and Japan do not much care whether they come in or stay; they got all they expected as against Great Britain under the 3-power treaty, and as for having the least disposition to attend further "conference after conference," as Mr. A. V. Alexander hopes and believes, we venture the very definite opinion that they will politely reply that they have had quite enough of conferring until the treaty of London is due to come under review in 1935. France and Italy may very likely continue to discuss naval affairs from time to time in the delightful environment of Geneva; they may well feel that there can be no harm in this, since nothing is ever done as the result. That either of them has the least desire to barter away perfect freedom in the framing of naval programs there is absolutely no evidence upon which to base expectation.

The truth is, we repeat, that France is taking the long view and contemplating the eventual "comeback" of Germany as a great naval power. Had Germany been invited to take part in the London conference it should have been perfectly feasible to make provision for the long view in her case. She is nursing grievances which lead her thoughts to sea power; she wants her colonial possessions back, and she wants to clear Poland out of the "Danzig Corridor." Notwithstanding, in her present mood she appears to be perfectly willing to take part in any international agreement affecting sea armaments. The idea may be that it will be plenty of time to invite her to take any

part in 1935, when the London treaty comes up for review. But by 1935 she may no longer be in her present mood. Meanwhile France will continue quietly to look toward the German "comeback" and probably continue to explain that Italian aspirations are the reason why she can not forego her freedom of naval policy.

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ITALY

FULL-POWER TRIALS OF ITALIAN CRUISER "ALBERTO DA GIUSSANO"

A recent article in the Italian press relative to the trials of the light cruiser *Alberto da Giussano* (4,896 standard tons) is quoted as follows:

The cruiser *Alberto da Giussano*, which was launched April 21, 1930, has just completed her full-speed steaming trials with great success. The cruiser was fully equipped.

Two months after launching the preliminary trials were begun on June 25, during which she easily made 36 miles per hour. On July 17, during her progressive speed trials she made 38.1. On July 30, during a preliminary full-speed trial lasting four hours an average of 38.77 miles per hour was made, developing over 100,000 horsepower on the shaft.

Displacement at the beginning of the run, 5,588 tons.

On August 29 the fuel consumption trials at 25 miles per hour took place, lasting 12 hours, and the results bettered the contract estimate.

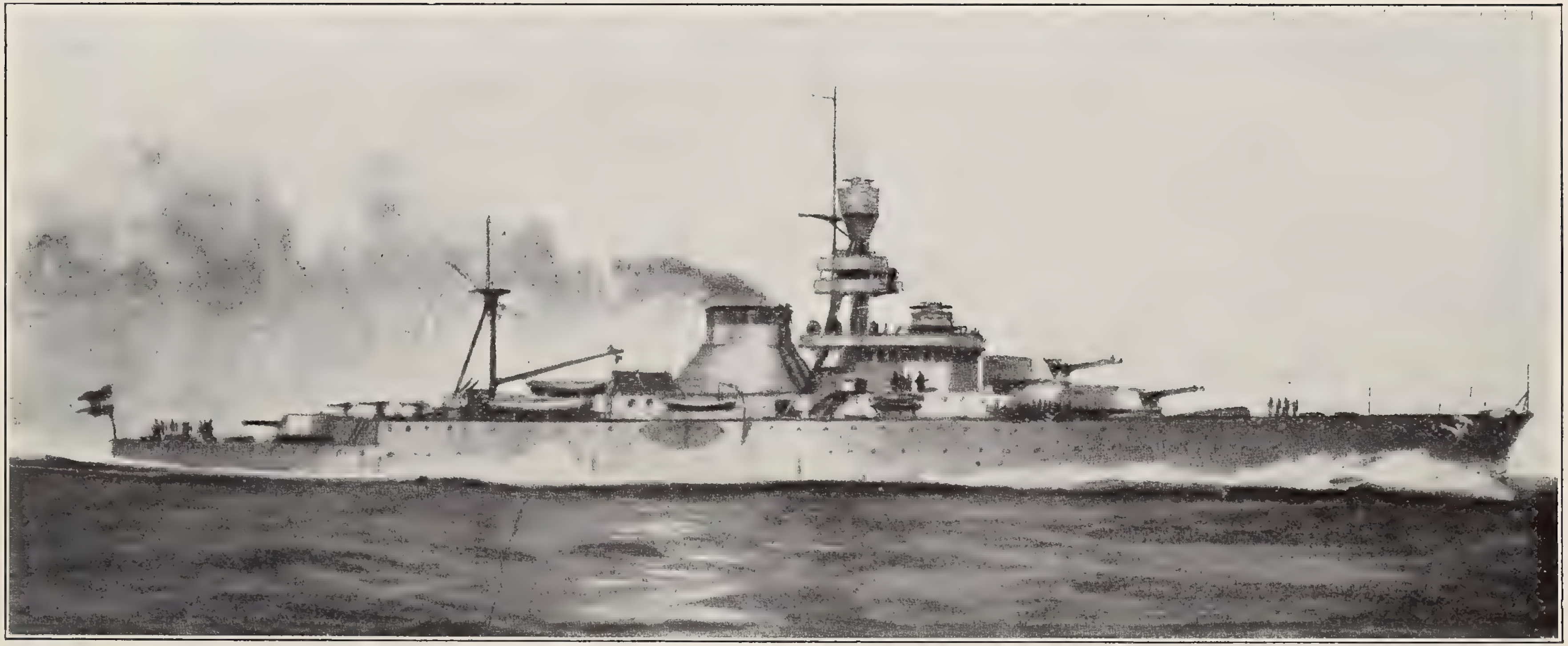
On September 9, with an initial displacement of 5,607 tons, the full-speed official trials were made, lasting eight consecutive hours, resulting in an average speed of 38.955 miles per hour, with a sensible margin of force in reserve.

On a base course, measuring about 160 miles in all, she developed an average speed of 39.3, and attaining a maximum speed of 40.7 miles per hour.

The speed is much superior to that made by any other cruiser existing to-day. The ship was built for 37 miles with a motor development of 95,000 horsepower.

The results obtained are satisfactory not only because of the motors, the shape of the hull, and the propulsion apparatus, the equibrizing of which brought about the notable increase in speed over the figures given in the contract, but because of the ease in maneuvering and the almost complete absence of vibration and the perfect control of the ship even with the rudder hard over.

These results confirm the value of the project, which, in many of its parts, contain amongst other notable characteristics the solid construction of the hull of the prevailing longitudinal type, the extensive use of special high-resistance steel, the concentration of the motors on only two shafts, with a total force of 110,000 horsepower; that is, 55,000 horsepower per shaft. This in itself is a risky innovation because up to now it has been considered unwise to install a force superior to 40,000 or 45,000 horsepower per shaft.



Argentine Cruiser "Veintecinco De Mayo" (Launched, August 11, 1929)

Another reason for satisfaction is the good account of itself given by the Italian Belluzzo turbine, which easily took care of the over-charge due to the increased motor power.

In summing up the results of the trials of the *Alberto da Giussano* we see that this type of light cruiser, which will enter our navy early next year as one of the first four examples, responds perfectly to the technical and military characteristics for which she was constructed and constitutes a well-balanced and fortunate solution of the problem of constructing cruisers of medium tonnage.

The *Alberto da Giussano*, the *Alberico da Barbiano*, and the *Bartolomeo Colleoni* were built by the firm of Ansaldo. Ships of this type are also under construction at the Terni-Odero shipyards at Spezia, the Tecnico Triestino, and the yards of the Royal Navy at Castellammare di Stabia.

It is understood that Italian naval authorities attribute the absence of vibration during the trials of the *Alberto da Giussano* to the tubular shape of her hull and to the additional longitudinal strengthening. It is also understood that the *Trento* vibrated at speeds around 27 and 28 knots, but with an increase in speed the vibration gradually disappeared.

ARGENTINA

FULL-POWER TRIALS OF NEW ARGENTINE CRUISER "VEINTECINCO DE MAYO"

On August 30, 1930, the full-power trials of the Argentine cruiser *Veintecinco de Mayo*, building in Italy, were held. It is reported that after 7 hours under way (90 minutes more than the time prescribed) the ship had covered 250 marine miles at an average speed of 32.7 knots. The constructors, wishing to hold an additional trial, not required by the contract, then covered the course from Portofine to Camogli four times at maximum power, realizing an average speed of 33.7 knots at about 90,000 horsepower developed in the shafts. This vessel was laid down in 1927 (launched August 11, 1929) at Leghorn, together with a sister ship, *Almirante Brown*, laid down at Genoa (launched September 29, 1929).

A recent visit was made on board the sister ship *Almirante Brown*, now fitting out at the works of the Odero Co. at Genoa, certain characteristics having been reported as follows:

Displacement.—Six thousand four hundred tons (condition of load not specified), but Jane's, 1929, gives a displacement of 6,800 standard tons.

Measurements.—Length, 543¼ feet; beam, 58 feet; draught, 16¼ feet.

Guns.—Six 7.5-inch, in three turrets (two forward and one aft), with the two guns of each turret in a single sleeve in accordance with the Italian practice.

Twelve 4-inch A. A. guns, in six twin, single-sleeve, mounts, with a reported elevation of 85°.

Torpedo tubes.—Six 21-inch, triple-mount, above water, located on adjacent, parallel, transverse tracks on second deck aft, racking in and out, one to starboard and one to port; and with suitable ports through the shell plating for taking torpedoes aboard.

Fire-control system was stated to be of Hasemeyer (German) design.

Aircraft stowage and launching gear.—There is a commodious hangar, extending for two deck heights below the forecastle deck, understood to be large enough to accommodate three to four planes (with wings folded or removed); and with a fixed launching air-impulse catapult leading forward over the forecastle. A telescopic mast and boom are provided for handling planes in and out of the hangar.

Structural.—The vessel was stated to have a bulb bow, which is in accordance with present Italian practice. No bulges or blisters were noticeable, and are entirely internal, if fitted at all.

There are two tripod masts; foremast contains three platforms, viz: Highest, main battery fire control; middle, secondary battery fire control; lowest, torpedo control and director. A lower station is provided on the mainmast for the corresponding afterfire controls.

The conning tower, 2-story, the lower of which is fixed, while the upper one is designed to rotate, presumably for use of the fire-control officer.

Quarters.—In officers' quarters most of the furniture is wood, although there is some metal (steel) furniture. Woodwork is untreated for incombustibility and is of good finish.

There are four cabins (exclusive of commanding officer's quarters), each provided with private bath. Particular attention has been paid to plumbing and sanitary arrangements throughout the ship.

All crew berthing, except for chief petty officers, will be in hammocks.

Main engines.—Two sets of Parsons single-reduction geared turbines, 75,000 horsepower, supplied with steam at 310 pounds pressure. The engines are staggered, as in our destroyers, port engine being forward. Circulating water intake and discharge are well up on the side, on account of shallow water in the River Plate.

Boilers.—Six Yarrow type of 12,500 horsepower each, two boilers each in three athwartship boiler rooms, separated by water-tight bulkheads. Uptakes lead into a single, very large smoke pipe directly abaft the foremast.

Separating the engine rooms from the boiler rooms are three separate transverse compartments, housing, respectively, from forward

to aft the following equipment: (1) Three main generators, (2) radio room, and (3) the evaporators.

Propeller blades.—Designed by Orlando, the following data is given for the cruiser *Veintecinco de Mayo*; and it is presumed that similar propellers are installed on the *Almirante Brown:*

Number of blades	3.
Diameter	13 feet 3.8 inches.
Pitch uniform	14 feet 5 inches.
Projected area (1 blade)	32.495 square feet.
Developed area (1 blade)	36.26 square feet.

Fuel.—Two thousand tons of oil, corresponding to a radius of 7,000 to 8,000 miles at 15 knots.

Additional gunnery notes.—The turrets of the *Veintecinco de Mayo* were manufactured at Oderno Terni, Spezia.

Following data apply to the main-battery guns:

Type: 7.5 inch, 52 caliber, built-up, three forgings.
Breech blocks: Open horizontally, away from each other.
Muzzle velocity: 3,147 F. S.
Weight: 30,800 pounds.
Service pressure: About 19 tons per square inch.
Maximum elevation: 45°.
Loading position: 10° only.
Rate of fire: 4 S. P. G. P. M. (by contract).

Ammunition hoists.—Outboard of each gun a 3-section hoist comes up, operated by a Waterbury universal speed gear. The lower cylinder contains the projectile and the cylinders above contain the powder bag and the brass case, respectively. From this car the projectile and powder are rammed into a hinged tray toward the rear of the turret. The tray swings laterally through an arc on an axis below the tray and is swung from a position behind the car to a position behind the gun.

Disposal of empty powder cases.—The charge is in two sections, the rear one being a brass case and the forward one a bag. There is a circular hole on each side of the rear turret plate through which empties are thrown out.

Training, elevating, hoist, and rammer motors are Waterbury universal speed gear.

SUBMARINE NOTES

GREAT BRITAIN

BRITISH OPINION ON SUBMARINE STERN TORPEDO TUBES

It is reported that while there is, among the operating personnel of the British Navy, a school of thought which is favorable to stern torpedo tube fire for submarines (said to be headed by the present rear admiral (S), commander of submarines) recent information is to the effect that preponderance of British submarine opinion is against the development of increased stern torpedo fire, and that apparently no effort is at present being made to develop this feature.

A BRITISH ANALYSIS OF SUBMARINE SITUATION

The following analytical discussion of the effect of the London naval treaty upon the submarine programs of Great Britain, Japan, and the United States is taken from The Navy (September, 1930), official organ of the British Navy League:

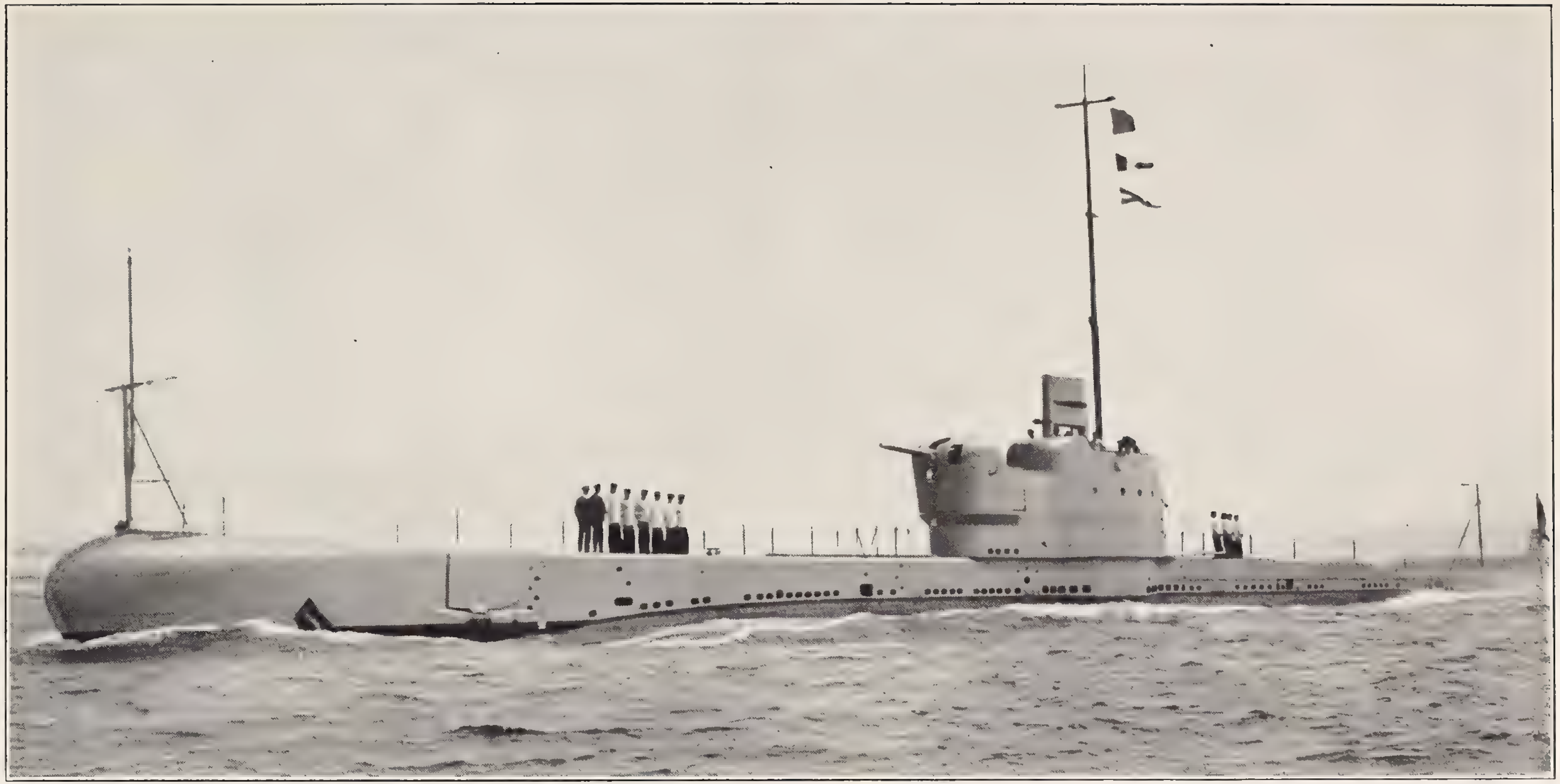
TABLE XXI.—*British submarine strength (1930)*

[All tonnages are "Geneva standard"]

Emergency war programs			Afterwar construction		
Number of boats	Class (or boat)	Total tons	Number of boats	Class (or boat)	Total tons
14	H	5,740	1	X-1	2,425
1	K-26	1,710	1	Oberon	1,311
19	Early L	14,440	1	Oxley (R. A. N.)	1,354
6	Later L	5,070	1	Otway (R. A. N.)	1,349
2	M	2,900	6	Odin	8,850
1	R-4	385	6	Parthian	8,850
			4	Rainbow	5,900
43		30,245	20		30,039

	Tons
Total, 63 boats	60,284
Tonnage as allowed by London naval treaty	52,700
Reduction required, 1930–1936	7,584

The rate at which our emergency war program submarines will become superannuated, up to the last day of 1936, is shown by the following summary:



H. M. S. "PERSEUS" (1,475 STANDARD TONS) COMMISSIONED, 1930. (EQUIPPED WITH 6 BOW TUBES AND 2 STERN TUBES)

TABLE XXIa.—*British submarines: Rate of obsolescence, 1930–1936*

[Abbreviations: E/L=early L classes; L/L=later L class]

Year completed (overage)	Boats	Total boats	Tons	Mounting total
1918–1931	5 H+9 E/L	14	8, 890	
1919–1932	7 H+4 E/L+1 L/L+R.4	13	7, 140	16, 030
1920–1933	2 H+2 E/L+1 L/L+2 M	7	6, 085	22, 115
1921–1934	1 E/L+1 L/L	2	1, 605	23, 720
1922–1935	None			23, 720
1923–1936	1 L/L+K-26	2	2, 555	26, 275

	Tons
Total, 38 boats	26, 275
Nonreplaceable tonnage	7, 584
Replaceable "overage" tonnage	18, 691

The residue of our emergency war program submarines, which will not have become " over age " by the end of 1936 are:

5 boats:	Tons
3 early L's (L–23, L–26, L–27)	2, 280
2 later L's (L–51, L–53)	1, 690
	3, 970

By the end of 1936 our submarine strength may be made up as follows:

	Tons
Residue of emergency war program boats	3, 970
"After-war construction" (Table XXI)	30, 039
	34, 009
New construction (replacement tonnage), 1930–36	18, 691
Submarine tonnage British Empire 1936 as L. N. T	52, 700

From the first lord's statement issued in explanation of the last navy estimates it appears to be the Government's intention to build about 18,500 tons of new submarines. This amount will be spread over five navy estimates (1929–30 to 1933–34) at an approximate average of 3,700 tons per program year. France contemplates the creation of a new submarine force, totaling 90,000 tons, and she has already gone a long way toward attaining that end. Since 1922 she has constructed, commenced, or ordered 67 submarines, totaling nearly 60,000 tons. Even if we build up to the very last ounce allowed to us under the new treaty, our submarine strength will, none the less, be surpassed by the force across the channel.

As in the case of destroyers, America is encumbered by a mass of superfluous submarine tonnage. So far as we can ascertain the

standing of the United States in this class of war vessel was, on January 1, 1930:

Number of boats	Description	Total tons
[1] 78	On active list	[1] 64, 160
31	On disposal list	16, 120
14	"Over-age" craft	15, 180
123		95, 460

[1] Includes 2 boats building (5,490 tons), but does not include the experimental hulk, S–4 (780 tons), without engines.

America, like ourselves, is only allowed 52,700 tons of submarines by the end of 1936. She must therefore condemn (and not replace) 42,760 tons out of the craft shown in the above summary. Measures are already being taken to achieve the necessary diminution of strength. Amongst the older types of United States underwater vessels entire classes have recently been put on the disposal list.

The total bulk of Japan's submarine force is 77,842 tons.[1] This amount is divided between 26 boats of the "first class" (41,657 tons) and 45 boats of the "second class" (36,185 tons). Seven "first class" boats (11,774 tons) were, however, unfinished on April 1 of this year and the last of them will not be delivered until 1932. Japan is allowed the same quota of submarines as the British Commonwealth Navies and the United States Fleet—52,700 tons. By the end of 1936 Japan must discard (and not replace) 25,142 tons of the submarines she now possesses.

There is only one other section of the new treaty upon which we would like to comment briefly. Part IV, article 22 (1), says:

> In their action with regard to merchant ships, submarines must conform to the rules of international law to which surface ships are subject.

From 1914 to 1918 the German submarines should have conformed, in their action with regard to merchant ships, to the rules of international law to which surface ships were subject. *Did they?*

It is all very well to look down one's nose and say: "Of course, the nations that signed the London treaty will *never* break their promises, and their submarines will always, in wartime, act in accordance with international law." A nation fighting with its back to the wall and with the submarine weapon in its hands will not hesitate to hit out savagely and without scruple, as Germany once

[1] This is the total tonnage, according to the "Geneva standard," and for the communication of these figures we are indebted to Lieut. Commander M. Nishisa, Imperial Japanese Navy, assistant naval attaché, London embassy. (The other statistics, relative to Japanese submarines, embodied in this paragraph, are the author's own compilations.)

did. What is going to happen to a submarine commander who, during hostilities, breaks the above injunction? Is he to be shot at dawn, hung at the yardarm, keelhauled, lashed to the bowsprit, or immured in solitary confinement for life? There is not a word about any such punishment in the new treaty. Is the man who sinks another *Lusitania* to be slapped, sent to bed early, and informed that he will have no jam with his rice pudding for a week? Penalties so horrible as these are not as much as hinted at! Of what avail is it to frame pretty little rules for regulating the conduct of submarines against merchant vessels unless a definite code of punishments for infraction of those rules is also laid down?

JAPAN

NEW JAPANESE SUBMARINES

The following tabulation represents the latest available information on some of the principal characteristics of new Japanese submarines, designated as the "I class":

Submarine	Laid down	Completed	Standard surface displacement	Speed		Engines		Gun	Torpedo tubes		Torpedoes
				Surface	Submerged	Main	Auxiliary		Bow	Stern	
			Tons								
I-56	1926	1929	1,635	19	9	2 Sulzer, 3,000 horsepower each.	2 Sulzer, 400 horsepower each.	[1] 1	6	2	[2] 14
I-57	1927	1929	1,635	19	9	do	do	[1] 1	6	2	[2] 14
I-58	1924	1928	1,635	19	9	do	do	[1] 1	6	2	[2] 14
I-59	1927	1930	1,635	19	9	do	do	[1] 1	6	2	[2] 14
I-60	1927	1929	1,635	19	9	do	do	[1] 1	6	2	[2] 14
I-61 [3]	1927	1929	1,635	19	9	2 Sulzer, 2,960 horsepower each.	do	[1] 1	6(?)	0(?)	[2] 14
I-62 [3]	1927	1930	1,635	19	9	do	do	[1] 1	6(?)	0(?)	[2] 14
I-63	1926	1928	1,635	19	9	2 Sulzer, 3,000 horsepower each.	do	[1] 1	6	2	[2] 14
I-64	1927	1930	1,635	19	9	do	do	[1] 1	6(?)	0(?)	[2] 14
I-65	1929		1,638	19	9	do	do	[1] 1	6(?)	0(?)	[2] 14
I-66	1929		1,638	19	9	do	do	[1] 1	6(?)	0(?)	[2] 14
I-67	1929		1,638	19	9	do	do	[1] 1	6(?)	0(?)	[2] 14

[1] 4.7 inches (wet mount).
[2] 21-inch.
[3] It is understood that the I-61 and I-62 are about 10 feet shorter than the other boats of this class.

Supplementing the above information the following specific notes have been received on submarine *I–58:*

Construction.—Similar to *I–52.*

Speed.—Surface, 19 knots; submerged, 7.5 knots; probably 3-hour rate of battery discharge.

Guns and ammunition.—One 4.7-inch gun, wet mount, located on deck forward of the conning tower. No deck stowage for ammunition. Has special hatch or ammunition hoist for serving gun. Two machine guns stated to be carried.

Torpedo tubes.—Six bow, two stern.

Aircraft.—None carried. No signs of any installations or apparatus that would indicate that aircraft could be carried.

Engines (main).—Two Sulzer 2-cycle 3,000 horsepower each.

Auxiliary.—Two Sulzer 2-cycle 400 horsepower each.

Batteries.—Stated to be Exide type and to occupy space under officers' quarters and control room.

Main motors.—Two 900 horsepower each.

Periscopes.—Three; two in control room, one in conning tower, Japanese built, using imported German optical glass.

Range finder.—None seen nor mounting for same apparent.

Sound.—Y tube and Fassenden oscillator.

Fuel capacity.—Stated to be 250 tons.

Complement on board.—Ten officers, including 3 special service officers, of whom 1 is engineer specialist and other 2 are deck officers; 60 enlisted men, of whom 30 are engineer ratings.

Miscellaneous.—Ballast tanks are nearly all located at ends of the boat. Control room is large; bridge is excessively spacious. Steering control located at each end of boat in addition to steering control in control room. All steering gear is of the Janey-Williams type. Gyro compass is of Anschutz type. Air compressors are of Luff and Rosens type. Electric measuring instruments are of United States manufacture. Hull is tested to a depth of 200 feet. Doors through bulkheads are of circular type similar to German practice, diameter about 3 feet. No new or novel salvage devices or arrangements noted.

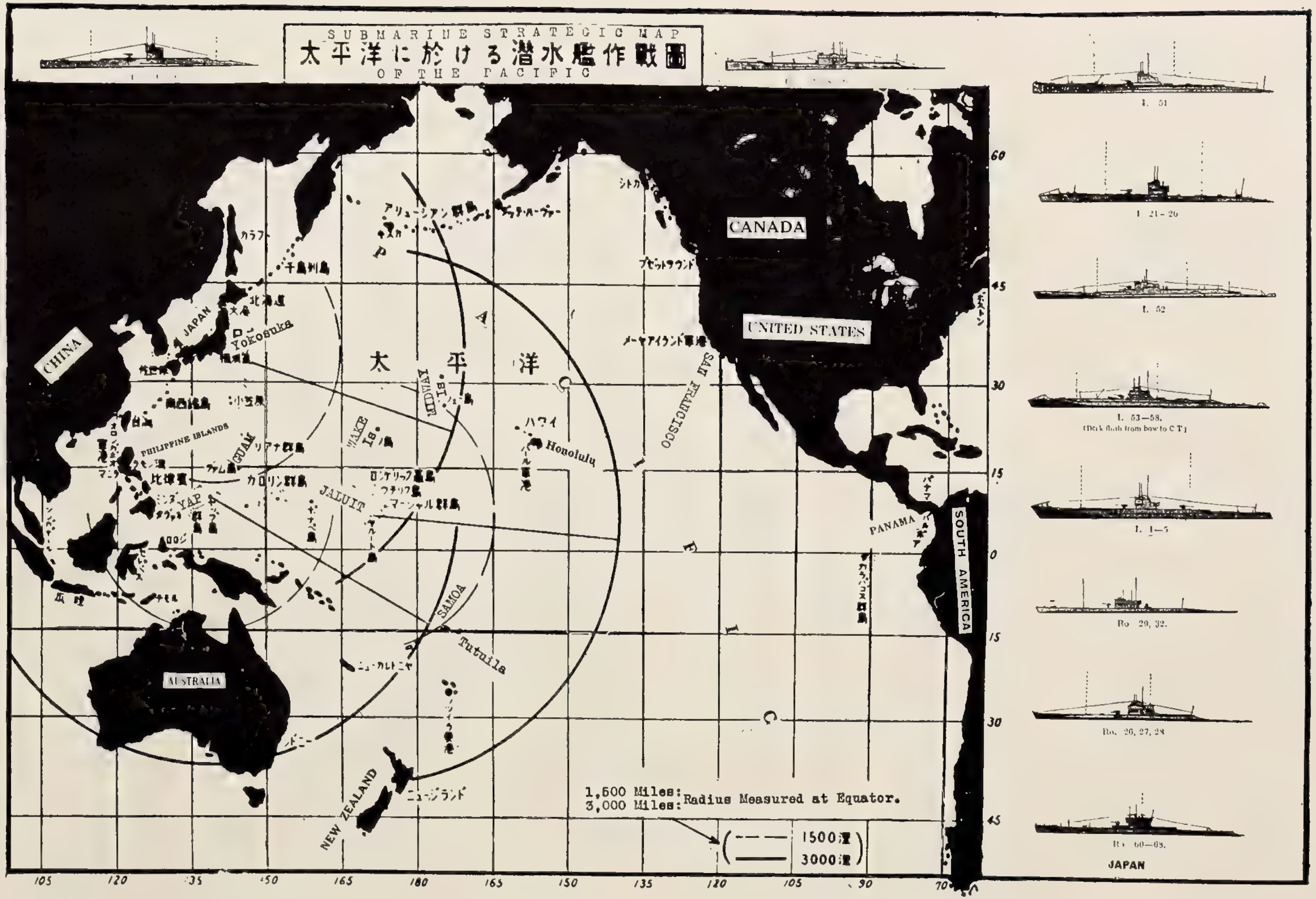
EXTRACT FROM "JAPANESE SUBMARINES"

The following translated extract is taken from a book published this year in Japan, *Japanese Submarines*, by the Japanese writer, Tadatka Izazaki, also author of the book "Japan Need Not Fear the United States," published in that country last year. The author is a graduate of the Imperial University, and, so far as known, is in no way officially connected with the Japanese Government:

In his book entitled "The Influence of the Sea on the Political History of Japan," Vice Admiral G. A. Ballard, of the English Navy, points out that "Japan stands now in a well-nigh impregnable position," and in explaining the excellent strategic position enjoyed by her asserts that "For any attack on Japan as matters stand now, the enemy must be in possession of a fleet about three times as powerful as that of the defense."

It is believed that Japan will never be beaten as long as the route of communication with the Asiatic mainland is under her command. Then, what type of ships is needed in maintaining this superior strategic position and in keeping the route open for herself?

It is self-evident that the type of ship best suited to the purpose is a submarine,



JAPANESE SUBMARINE STRATEGIC MAP OF THE PACIFIC

In order to maintain the route of communication between Japan and the Asiatic mainland it is indispensable to blockade the Formosan Channel and the straits of the southwestern islands, so that an enemy fleet may be kept out of the eastern Chinese Sea. Aircraft and mines would contribute a great deal to carrying out this plan, since there are innumerable points suitable for the aircraft bases, beside the fact that laying mines would be easy in that limited area.

When submarines are added to the means of defense, no fleet would be able to invade the Yellow Sea, which lies directly on the route of the communication.

The fact that the eastern Chinese Sea is both shallow and muddy gives a great facility to this form of defense. For when a submarine is submerged under the muddy waters, even her deadly foe, an aircraft can not find her position. In a shallow sea such as the eastern Chinese Sea, a submarine can stop its propeller and rest on the bottom of the sea, which would place her beyond the means of enemy detection. Since, according to Rear Admiral Magruder, " the hulls of the vessel (submarine) are made strong enough to withstand the pressure at a maximum depth of about 200 feet," the eastern Chinese Sea, where there are many places far less than 30 fathoms in depth, is the most convenient sea for submarine action.

The same thing can be said as to the defense of the coast line of Japan.

From the standpoint of the offensive-defensive plan of campaign to be adopted by Japan in the time of an actual warfare, the main strategy of the Japanese Navy would be surprise attacks on an enemy fleet for the purpose of reducing its strength as much as possible.

The most needed weapon then for the Japanese Navy will be the submarines, lacking which it might even be said that the offensive-defensive campaign could not be employed, which would mean either to leave the coast of Japan bare to the attack of the enemy fleet or taking chance in fighting out the battle against the superior enemy strength. It should be remembered in this connection that both aircraft and mine are after all capable of performing only a sectional defense. To carry a desperate and forced battle of this kind will never be the work of a strategist but of a speculator.

The long coast of Japan, with innumerable small harbors, is best fitted for being the bases of the submarines, and the deep sea off the eastern coast of the islands of Japan, which does not allow a blockade by means of mines, offer an ideal ground for the submarine warfare.

So far as the submarines are concerned, the relation between France and England is seemingly much like that between America and Japan; however, there is a fundamental difference between the two sets of relationships which must not be forgotten. While France could threaten the trade routes of England, Japan could never do the same against those of the United States, which extend both in the Pacific and the Atlantic.

Japan's first line of defense should be the line connecting Marshall, Caroline, Marianne, Bonin, and Pelew Islands, beyond which no enemy vessel should be allowed to come in, either northward or southward. If the Japanese Navy should be satisfied in defending the coast line of the mainland from the outset, a part of the battle could be said to have been won by the enemy before an actual warfare was started.

In defending this first line of national defense the submarines are the type of ships best suited to the purpose.

A surmise made as to the activity of the Japanese submarines in a future warfare:

If a supposition should be made that at the outset of an actual warfare both the Philippines and Guam fell into the hands of Japan, the Manila Harbor of the Philippines would be made the main base of the submarines sent to the islands under the Japanese mandate in the South Seas, more than a thousand in number. As the result the Philippines would become the center of the provisions for the submarines.

Then, since Guam is situated in the center of the South Sea Islands under the Japanese mandate, the possession of the island would be a great strategic advantage. Moreover, though small, since Saipan, Ponape, Yap, Palau, and Truk of the Marianas Islands, and Jaluit of the Marshall Islands possess a certain number of inhabitants, they themselves are capable of becoming minor bases for smaller-sized vessels.

The orders to be given to the submarines as soon as an actual warfare breaks out would be:

(1) To watch over the enemy activities.

Since Guam Island is only 450 miles distant from Yap Island, and 150 miles from Saipan, it would not be very difficult to keep constant watch over it. The same thing can be said of Wake and Midway Islands, since the former is only 500 miles distant from Rongerik Islands of Marshall Islands, and the latter not much over 1,300 miles away. Even the Pearl Harbor is at a distnce of about 2,000 miles from Utirik Island, while the Pago Pago Naval Station of Tutuila Island is, more or less, 2,000 miles distant from Jaluit Island.

(2) To cut the lines of communication between the enemy naval bases in the Pacific.

A submarine starting from a certain island in the Marshall Islands will have to steam at least 3,000 miles before the route of communication between the west coast of the United States and Hawaiian Islands is reached. However, for the I class submarines with continuous sailing capacities of 8,000 miles and up to well over 10,000 miles, this will not be a difficult task to perform.

(3) To lay mines near the enemy naval bases.

Since the Navy has more than 10 mine layers among the ocean-going submarines, they would be the most suited to this line of duty.

(4) To lay the line of defense in the Pacific, using the South Sea islands as the bases.

(5) To cut the routes of trade along the west coast of America.

ITALY

NEW ITALIAN SUBMARINE "DELFINO"

The Italian submarine *Delfino* (810 standard tons) launched in April, 1930, was recently visited.

Framing.—An interesting feature of the submarine is the nickel steel imported from England, of which all the plating is made. The framing is common steel with a frame space of 24 inches instead of 18 inches. The small boats (600 tons) have a frame space of 20 inches.

Engines.—The very large motor room demanded by the handling and storage of torpedoes has resulted in the engines of these boats being reduced in size from 1,500 to 750 horsepower, and the speed has been correspondingly reduced. The design, therefore, has sacrificed speed to effective armament.

Topedo compartments.—These large torpedo compartments fore and aft serve as crews' living quarters. Also stowed in these compartments are the ship's air bottles which are stowed between frame spaces, one large and one small bottle between each frame. In the after torpedo room, or motor room combined, are the main motor air coolers of the Boldrochhi type, which are said to keep these living spaces habitable at all times. Nothing unusual was noted with regard to the torpedo stowage and handling.

Torpedo tubes.—The four after torpedo tubes were observed; this boat has eight tubes as compared to the four carried by our S type of about the same tonnage and equal, or only slightly superior, speed.

Storage battery.—Ironclad type. A battery explosion occurred on this vessel in March, destroying the tops of all the jars of the forward battery; cause of explosion, faulty operation of battery ventilation system. There was no loss of life.

Escape trunk.—The escape trunk extends from strength hull to strength hull the entire depth of the boat, acting as a stiffener for the corrugated steel bulkhead. The bulkhead is built in large radius (about 3 feet) corrugations. There were four of the corrugations on the bulkhead from top to bottom. It was stated that they have been tested to a pressure corresponding to 131 feet. They are expected to withstand the pressure of 393 feet, although they are actually much lighter than the normal plate bulkhead. They are also lighter than the dish type German bulkhead. This saving in weight of the bulkhead is due to the shape of the bulkhead and the stiffening effect of the escape trunk.

This escape trunk, in its upper section, acts merely as an escape hatch similar to those on the *T–1* to *T–3* type. The lower half, below the compartment deck, however, is being fitted with a special type of escape device which has been invented by one of the constructors at Monfalcone.

Italian-built submarines for Turkey and Argentina.—Building also at Monfalcone are four submarines for the Turkish Navy. At Fiume are building two submarines for the Argentine Navy. These boats are all very much the same type and are similar to the Mameli class of Italian submarines.

SUBMARINE COMPARISONS

UNITED STATES

Submarines	Laid down	Completed	Standard surface displacement	Speed		Guns	Torpedo tubes	
				Surface	Submerged		Bow	Stern
			Tons	*Knots*	*Knots*			
V-5	1929	1930	2,730			1, 6-inch	4	2
V-6	1929		2,730			1, 6-inch	4	2
V-4	1925	1928	2,660	14.6	8	2, 6-inch	4	0
V-3	1921	1926	1,910	19.25	8	1, 5-inch	4	2
V-2	1921	1925	1,910	18.75	8	1, 5-inch	4	2
V-1	1921	1924	1,910	18.75	8	1, 5-inch	4	2

BRITISH EMPIRE

Rainbow	1929	[1]	1,475	17.5	9	1, 4-inch (?)	6	2
Regent	1929	[1]	1,475	17.5	9	1, 4-inch (?)	6	2
Regulus	1929	[1]	1,475	17.5	9	1, 4-inch (?)	6	2
Rover	1929	[1]	1,475	17.5	9	1, 4-inch (?)	6	2
Parthian	1928	1930	1,475	17.5	9	1, 4-inch (?)	6	2
Perseus	1928	1930	1,475	17.5	9	1, 4-inch (?)	6	2
Poseidon	1928	1930	1,475	17.5	9	1, 4-inch (?)	6	2
Proteus	1928	1930	1,475	17.5	9	1, 4 inch (?)	6	2
Pandora	1928	1930	1,475	17.5	9	1, 4-inch (?)	6	2
Phœnix	1928	1930	1,475	17.5	9	1, 4-inch (?)	6	2
Orpheus	1927	1929	1,475	17.5	9	1, 4-inch	6	2
Olympus	1927	1929	1,475	17.5	9	1, 4-inch	6	2
Odin	1927	1929	1,475	17.5	9	1, 4-inch	6	2
Otus	1927	1929	1,475	17.5	9	1, 4-inch	6	2
Oswald	1927	1929	1,475	17.5	9	1, 4-inch	6	2
Osiris	1927	1929	1,475	17.5	9	1, 4-inch	6	2
Oxley	1924	1927	1,354	15.5	9	1, 4-inch	6	2
Otway	1925	1927	1,349	15.5	9	1, 4-inch	6	2
Oberon	1924	1927	1,311	15.0	9	1, 4-inch	6	2

[1] Due in 1931.

JAPAN

I-65	1929		1,638	19	9	1, 4.7-inch	6(?)	2(?)
I-66	1929		1,638	19	9	1, 4.7-inch	6(?)	2(?)
I-67	1929		1,638	19	9	1, 4.7-inch	6(?)	2(?)
I-64	1927	1930	1,635	19	9	1, 4.7-inch	6(?)	2(?)
I-59	1927	1930	1,635	19	9	1, 4.7-inch	6(?)	2
I-62	1927	1930	1,635	19	9	1, 4.7-inch	6(?)	0(?)
I-61	1927	1929	1,635	19	9	1, 4.7-inch	6(?)	0(?)
I-60	1927	1929	1,635	19	9	1, 4.7-inch	6	2
I-57	1927	1929	1,635	19	9	1, 4.7-inch	6	2
I-56	1926	1929	1,635	19	9	1, 4.7-inch	6	2
I-63	1926	1928	1,635	19	9	1, 4.7-inch	6	2
I-58	1924	1928	1,635	19	9	1, 4.7-inch	6	2

Submarine comparisons—Continued

FRANCE

Submarines	Laid down	Completed	Standard surface displacement	Speed		Guns	Torpedo tubes	
				Surface	Submerged		Bow	Stern
			Tons	*Knots*	*Knots*			
Q-171	1930		1,379	17		1, 5.5-inch	[2] 11	(?)
Q-172	1930		1,379	17		1, 5.5-inch	[2] 11	(?)
Q-167	1929		1,379	17		1, 5.5-inch	[2] 11	(?)
Q-168	1929		1,379	17		1, 5.5-inch	[2] 11	(?)
Q-169	1929		1,379	17		1, 5.5-inch	[2] 11	(?)
Q-170	1929		1,379	17		1, 5.5-inch	[2] 11	(?)
Phenix	1928		1,379	17		1, 3.9-inch	[2] 11	(?)
Pegase	1928		1,379	17		1, 3.9-inch	[2] 11	(?)
Protee	1928		1,379	17		1, 3.9-inch	[2] 11	(?)
Persee	1928		1,379	17		1, 3.9-inch	[2] 11	(?)
Promethe	1928		1,379	17		1, 3.9-inch	[2] 11	(?)
Ajax	1928		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Achille	1928		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Argo	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Acheron	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Acteon	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Fresnel	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Archimede	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
H. Poincare	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Poncelet	1927		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Monge	1926		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Pasteur	1926		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Pascal	1926		1,379	17	10	1, 3.9-inch	[2] 11	(?)
Vengeur	1926		1,384	17	10	1, 3.9-inch	[2] 11	(?)
Surcouf	1926		2,880	18		2, 8-inch	[2] 12	(?)
Redoubtable	1925		1,384	17	10	1, 3.9 inch	[2] 11	(?)

ITALY

Submarines	Laid down	Completed	Standard surface displacement	Surface	Submerged	Guns	Bow	Stern
E. Fieramosca	1926	1929	1,339	19	10	1, 4.7-inch	[3] 10	(?)
A. Sciesa	1925	1929	1,368	18.5	9	1, 4.7-inch	[3] 6	(?)
E. Toti	1925	1928	1,368	18.5	9	1, 4.7-inch	[3] 6	(?)
D. Millelire	1925	1928	1,368	18.5	9	1, 4.7-inch	[3] 6	(?)
Balilla	1925	1928	1,368	18.5	9	1, 4.7-inch	[3] 6	(?)

CHILE

Submarines	Laid down	Completed	Standard surface displacement	Surface	Submerged	Guns	Bow	Stern
Capitan O'Brien	1928	1929	1,400	15	9	1, 4-inch	6	0
Capitan Thompson	1929	1930	1,400	15	9	1, 4-inch	6	0
Almirante Simpson	1929	1930	1,400	15	9	1, 4-inch	6	0

[2] The disposition of the torpedo tubes on the latest French submarines is not definitely known, although it is known that some of them have deck tubes in addition to submerged hull tubes. In this connection a recent London press dispatch comments as follows on the launching at Brest, on May 28, 1930, of the French submarines Achille and Ajax: "The Achille class are of 1,379 tons surface displacement, or about the same size as the submarines now being added to the Royal (British) Navy, but they have greater engine power and a speed of 18 as compared with 17½ knots. A feature of their design is the large number of torpedo tubes fitted, of which there are 11. Contemporary British vessels have 8; those of the United States, 6; Japan, 8; and Italy 6 or 8." It will be noted that Jane's (1929) credits the French submarines of the Redoutable class with ten 21.7-inch tubes, including 2 sets of revolving triples, 1 bow, and 1 stern.

[3] The disposition of torpedo tubes on the above Italian submarines is not definitely known at present.

CHINA SINCE THE ESTABLISHMENT OF THE REPUBLIC

A brief résumé of Chinese affairs since the establishment of the Republic follows:

The revolution of 1911, which resulted a year later in the overthrow of the Manchus and establishment of a republican form of government at Peiping, was instigated by the men who were the

New outline map of China

founders of the present Kuomintang party, now dominating the central Government at Nanking. After establishing a provisional government in Nanking, their next step, in order to avoid a division of the country, was to oust the Emperor and install Yuan Shih-kai as President at Peiping. Just when the Kuomintang evolved from the Tung Men-hui, a revolutionary society, is not clearly known, but it was approximately at the time of the revolution.

Almost immediately the Kuomintang was prescribed as a seditious organization, and the President pushed his plan to become Emperor.

However, the personal ambitions of various leaders introduced intrigue and discord which resulted in revolutions, regional dictatorships, and intersectional fighting. In 1918 a southern government was established at Canton, and in 1921 Sun Yat Sen was elected President of southern China. It was the radical tendencies of this southern government, desirous of improvements, that sought advisers abroad. After unsuccessful attempts to obtain missions in Canada, United States, England, and Germany, the Soviets readily accepted the invitation, and sent Borodin as high adviser to the Kuomintang. Meanwhile the seeds of Soviet doctrine had drifted to China and a Communist Party had been organized as a secret society by the students. This developed rapidly under the secret assistance of the Russian Embassy in Peiping, but little was known of this party until its application and admittance to the Kuomintang in 1924, just after Borodin's arrival.

In 1925 the Peiping Government, then under kaleidoscopic control of military leaders such as Feng Yu-hsiang, the " Christian general " from Shensim Province, Wu Pei-fu from Szechuan Province, and Chang Tso-lin from Manchuria, inspired by a temporary settlement of difficulties with the Mukden Government under Cheng Tso-lin (pro-Japanese), attempted unification of China by agreement, but Canton objected to subordinating the Kuomintang to other parties. Following the 30th incident at Shanghai gave a tremendous impulse to the Communistic and antiforeign movement. In Canton a definite break with the Peiping Government was announced. Chiang Kai-shek, the principal of the Canton Military Academy, emerged and proclaimed himself commander in chief of the southern army. The soviet system of government was inaugurated with Russian and Chinese Communists placed in pivotal positions and Borodin became dictator. However, Chiang Kai-shek soon developed an anti-Communistic attitude and would have ousted all the Communists but for the threatened southern drive of the Peiping Government, then under Wu Pei-fu. This forced Chiang to accept Borodin's terms to obtain Russian assistance for an offensive northward.

The success of this Kuomintang drive, beginning in July, 1926, is well known, the last of the Wuhan cities, Hankow, Hanyang, and Wuchang, falling on October 8 and the political bureau set up in Hankow. From there the antiforeign activities, inspired by such successes as the occupation of the British concession at Hankow, were begun. At this stage the differences between Chiang and the left wing of the Kuomintang party increased, resulting in the definite decision of Chiang to break with the Communists, at that time controlled by Eugene Chen and Borodin.

In March, in disobedience to party orders to proceed to Hankow from Kanchang, where his headquarters rested, Chiang made a coup by proceeding to Nanking and setting up the capital, thereby denuding the Government of the proletariat at Hankow. But this move was almost thwarted by the "Nanking incident," said to have been planned by Chiang's enemies to bring foreign intervention. Chiang's successes down the river forced Sun Chuan-feng to flee from Shanghai, where he had enjoyed a regional dictatorship for some years, and the five southeastern Provinces came under the domination of Nanking. Chiang then began the widespread war against the Communists and labor unions. As if approving this action, in April, 1927, the Peiping Government, under the Mukden marshal, Chang Tso-lin (Wu Pei-fu having been driven out), raided the Russian Embassy and showed its connection with the Communists. At this time Shantung was under the control of Chang Chun-chang, another regional dictator. By July anti-Communistic sentiment had so increased that Borodin and his aides were ousted, and in November Hankow was taken over by Nanking armies. In January, 1928, the Nanking government was organized with Chiang Kai-Shek as Generalissimo.

At this stage Chang Chung-chang occupied Shantung; Feng Yu-hsiang in Honan was attacking northern forces of Chang Tso-lin then controlling Peiping, and civil war was in progress in other parts, while Yen Shi-shan rested peacefully in his model Province of Shansi and Wu Pei-fu had retired to a far western Province.

On February 27, 1928, after an alliance with Feng and Yen Shi-shan, the governor of Shansi, Chiang Kai-shek started the completion of the northern expedition for the unification of China, with an offensive up both railways. In April the successes of the Nationalists in Shantung brought them in conflict with the Japanese, resulting in the Tsinan incident. While this delayed Chiang's absence, Feng pushed ahead, personally desirous of occupying Peiping and Tientsin, with the control of Shantung as his objective. Meanwhile Chiang Tso-lin, embarrassed over the Tsinan incident, on account of his previous relations with Japan, evacuated Peiping and was blown up on his way to Mukden, leaving his son, Chang Hsueh-liang, in command. However, Feng's ambitions were thwarted when Yen Shi-shan occupied Peiping before Feng could arrive. The Mukden forces were pursued to the Great Wall, but invasion of Manchuria was forbidden by Japan.

The Kuomintang army, now known as the Nationalists, were confronted with the problem of disbanding the huge army now in the field. A conference in January, 1929, evolved plans for disbandment agreed upon by the major leaders. However, when an attempt was made to put the plans into effect there resulted wide-

spread revolts of subordinate leaders. This, together with the discontent and the political and material ambitions of Yen and Feng, produced an alliance against Nanking, resulting in the major conflict beginning in the spring of 1930. After passing through many crises the political and military strategy of Chiang Kai-Shek accomplished a deadlock, which Nanking knew would be fatal to northern resources and interests.

In September the Shansi forces, hard pressed in Shantung, retired to their Province, and Chang Hsueh Liang, "in the interest of peace," occupied Peiping immediately after the peaceful withdrawal of Yen Shi-shan. This occupation is agreeable to Nanking for the present at least.

At present—October 3—Feng Yu-hsiang is holding out against the Nationalists in Honan, but his withdrawal is imminent and then the Nationalists should be free from military activity for the winter at least.

Other outstanding international complications not included above are:

The Japanese boycott due directly to the Tsinan incident.

The seizure of the Chinese Eastern Railroad by the Soviet.

This résumé does not include the significant changes under way at present and vitally affecting international relations. These include:

Extraterritoriality and rendition of concessions.

Tariff autonomy.

Control of cables and telegraph.

Inland navigation.

Revision of treaties.

THE CHINESE EASTERN RAILWAY DISPUTE

The original agreement for the construction of the Chinese Eastern Railway was signed in Russia in 1896, the term of lease being 80 years. Li Hung Chang, then ambassador extraordinary to the coronation of Czar Nicholas II, acted for the Chinese. For reasons of international benefit the construction of the railway was carried on by a company financed by the Russo-Chinese (later the Russo-Asiatic) Bank with French capital. It was agreed that the Chinese Government subscribe 5,000,000 taels to the bank, agreeing to participate in proportion to this amount in the profits and losses and to grant a concession for the construction and operation of the railroad. The Chinese Eastern Railroad Co. was organized by this bank with only Russian and Chinese shareholders. The road was completed in 1900. Under the agreement between the bank and the company China was given the option of redeeming the railway in 36

years by reimbursement of all capital invested, assumption of all debts contracted, and payment of interest thereon. Failing such redemption the line was to pass to China's ownership free of charge after 80 years. The optional period expires in 1936, and the Chinese Government naturally wishes to take advantage of this opportunity, especially as the conflict between the Manchurian and Soviet Governments regarding the railway has not been settled. The Chinese are obviously unable to raise from their own resources the capital to pay the Russians the sums invested, and it is reported that a group of American financiers, as well as representatives of the Soviet Government and of the Russo-Asiatic Bank, are negotiating regarding the future of the railroad.

The Chinese Eastern Railway has for more than 30 years been a source of bitter controversy. During the Boxer rebellion Russia sent large bodies of troops to occupy Manchuria, and her failure to withdraw these troops later on was one of the contributing causes of the Russo-Japanese War. After that conflict Russia still controlled the trunk line of the railway in northern Manchuria, though she was forced to surrender her holdings in southern Manchuria to Japan. Then came the World War of 1914, the end of Imperial Russia, and for a time interallied supervision of the railway under an American executive. In 1920, by agreement, the Chinese Government, in the absence of a recognized Russian government, took over temporarily the supervision of the railroad.

The Washington conference was unable to reach any agreement about the railroad, passing only a resolution for the better protection of personnel and increased economy.

On May 31, 1924, the Peiping Government recognized the Soviet Government and agreed to the provisional management of the railroad by a board of 10 members—5 Chinese and 5 Russian. This marked the end of the influence of the Russo-Asiatic Bank over the railroad, and the status of the shares in the company becomes obscured. On September 20, 1924, the Soviet signed a separate agreement with the Mukden Government under Chang Tso-lin similar to that signed with Peiping. It is important to note that both of these agreements provided for a joint commission appointed by the two Governments to meet and settle the indebtedness of the railroad and the conditions of its transfer to the Chinese Government.

It was 14 months before the Sino-Russian committee finally convened in Peiping and no conclusion has yet been reached. The theoretical Sino-Russian joint partnership was further thwarted by the Russian directors absenting themselves from the board meetings and thereby preventing the board from meeting. It is over the terms of this partnership that the present dispute has arisen. Chinese seizure

of the line in April, 1929, is said to have been provoked by Russia's failure to abide by certain provisions of the treaty establishing joint control. After this seizure, the Chinese exercised a drastic control until the Habarovsk agreement and protocol on December 22, 1929, which provided (1) for reversion to the status before the Chinese seizure and (2) a conference at Moscow (now in session) to consider all details of control.

At this writing (November) it is just reported that the conference is about to break up on the grounds that the Chinese have not carried out the provisions of the above protocol.

MINE LAYERS AND MINE SWEEPERS

The subject of high-speed mining operations, both laying and sweeping, has for some time been engaging the serious attention of leading foreign naval powers. This is apparent from the construction of new vessels specially designed for the purpose. Japan has been especially active in converting old destroyers into sweepers.

GREAT BRITAIN

MINE LAYERS

Since the World War, Great Britain has constructed (laid down 1924) one high-speed cruiser mine layer, the *Adventure*, 6,740 tons standard displacement, designed speed 27.75 knots. For description of this vessel see O. N. I. BULLETIN (February, 1928).

MINE SWEEPERS

Of the British postwar mine-sweeper program, two vessels have now been completed, *Bridgewater* and *Sandwich*. Both of these vessels are of the sloop class, were laid down in 1928, and completed in 1929. They are of 945 tons displacement, designed speed 17 knots, twin-screw turbine, and carry two 4-inch guns. It is understood that other vessels of the sloop class are also intended for sweeper operations, all of which have a designed speed of 15 knots or over.

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JAPAN

MINE LAYERS

The mine layer *Itsukushima* (1,970 standard tons) was launched at the Uraga dockyards on May 22, 1929; she is the first mine-laying vessel of postwar design to be built in Japan; dimensions 328 by 42 by 10 feet; speed, 17 knots; three 5.5-inch and two 3-inch anti-aircraft guns.

The Japanese press recently reported that the Kure Navy Yard has received orders from the Navy Department to lay down early

in September, 1930, another mine layer, to be known by the name of *Yaeyama*, and of same characteristics as *Itsukushima*.

Some of the latest Japanese submarines are also fitted for mine laying.

MINE SWEEPERS

Japan has built six specially designed mine sweepers, all completed since 1923, with characteristics as follows:

Displacement, 700 tons; length, 235 feet; beam, 26⅓ feet; draft, 7½ feet; speed, 20 knots; complement, 87; armament, two 4.7-inch guns, two 3-inch antiaircraft guns, two depth-charge throwers.

The following old destroyers have also recently been fitted as mine sweepers; *Umikaze*, *Yamakaze*, *Nara*. and *Enoki*.

JAPANESE NAVAL MINING ORGANIZATION

Organization of the Mine Establishment Ashore

The design, experimentation, construction, repair, preservation, accumulation of reserve supplies, and distribution of ordnance material is the duty of the naval technical department of Tokyo. This department has charge of the mine production plants.

Mine manufacturing plants.—Mines are manufactured at the arsenals at Kure and Yokosuka only. The principal establishment is at Kure.

Mine depots.—Every naval station is a mine base and has an equipment of mines considered sufficient for the naval district of which it has supervision.

Mine research laboratory.—There is only one mine experimental laboratory, located at Yokosuka.

Mine schools.—One section of the torpedo and radio school at Yokosuka is devoted to the study of mines. Four mine sweepers are attached to the school for instruction purposes.

Mine Doctrine

It is evident that a thoroughgoing defensive policy embracing mines, nets, and submarines is depended upon for the obstruction of the entrances to the Inland Sea, the principal ports, and the passages between the islands. This is pointed to, not only by the rôle which the country would be expected to take in a major war, but by the location of mine deposits and mining vessels and by the physical characteristics of the country and the neighboring lands, which would make mining such an available defensive measure.

In the formulation of war plans covering (1) the maintenance of communications with the Asiatic continent, (2) the closing of the entrances to the Japan Sea and the Inland Sea, and (3) the defense of the many bays and harbors of the main islands of Japan, the Japanese naval general staff lay great importance upon the use of mines.

The three principal mine bases are located at Sasebo in the south, Ominato in the north, and at Chinkai on the coast of Korea. Mining exercises are continually carried out operating from these bases.

Organiaztion of Mine Establishment Afloat

All light cruisers, first line, and first line destroyers are reputed to be equipped to carry both mines and depth charges.

There is no active mining unit in the organization of the First and Second Fleets corresponding to the mine squadron in our Control Force, as practically all vessels are kept in a condition for inclusion at any time in the active operations of the fleets. The general doctrine appears to be that the mine-laying vessels shall be based on naval ports and operate therefrom.

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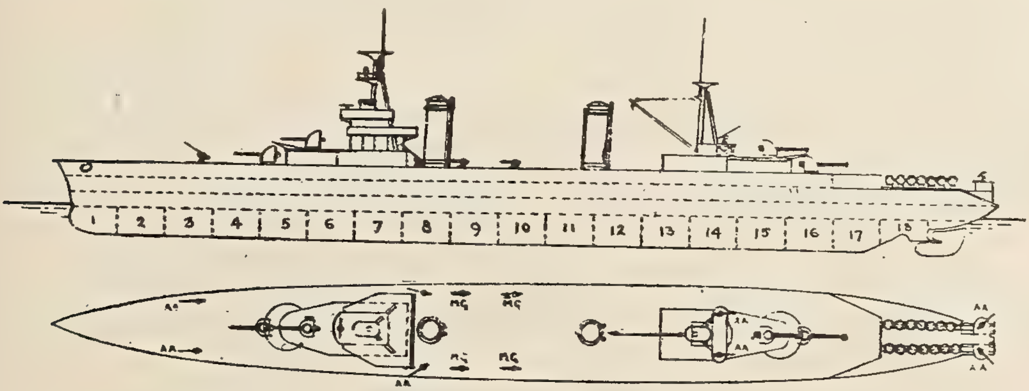
FRANCE

THE MINE LAYER "PLUTON"

The French mine-laying fleet is slowly expanding. The 5,300-ton mine-laying cruiser *Pluton* has just been commissioned for trials at Lorient. She is of the 1925 program, was laid down in 1928, and is a smaller and modified copy of the 7,000-ton British *Adventure* (27.7 knots). But she is faster than the British vessel, being expected to do 30 knots with 57,000 horsepower; she is also better armed, mounting four 5.5-inch guns and ten 1.5-inch antiaircraft guns, but is said to be inferior in sea-keeping qualities and in the number of mines carried. Her silhouette has been made to resemble somewhat that of the 10,000-ton *Duquesne* class, with two funnels widely separated and two tripod masts.

The mines, loaded aboard forward, are all carried on one deck about 15 feet above the normal water line. The mines are launched from a chute on each side aft. Quarters are said to be available for 16 officers, 84 petty officers, and 300 enlisted men, and are located similarly to those of the 10,000-ton cruisers, considerable attention having been given to habitability of the quarters. It is reported that a sister ship has been ordered.

The *Pluton* has undergone many changes in design since she was first projected. The French were very interested in the British *Adventure*, particularly in her Diesel cruising machinery, and construction of *Pluton* was delayed for some time pending a study of *Adventure's* performance. It is reported that they finally decided that the weight which had to be allowed for Diesel cruising machinery was not consistent with French requirements, which for a mine layer are principally to proceed at high speed to a given area, lay a mine-field, and retire under cover of darkness. Such a ship could operate effectively with a cruiser squadron or flotilla leaders and, working from a Mediterranean base, could lay a large mine field and be out of the danger area within a single night. Thus they decided to install Brequet turbines with single-reduction gearing. The idea of cruising for long periods with the fleet does not appear to enter into French mine-laying doctrine. Therefore *Pluton* sacrifices other factors for speed.



French mine layer *Pluton*

Two ex-Russian icebreakers of 14 knots, the *Castor* (4,300 tons) and *Pollux* (3,267 tons), have also been equipped at Lorient for mine laying; the *Castor* carries 368 mines and the *Pollux* 234 mines.

The following French submarines, all of postwar design, are fitted as mine layers:

	Number of mines carried
Pierre Chailley	40
Maurice Callot	27
Saphir class (5 boats)	32

The mine-laying ex-German submarines *Victor Reveille* and *René Audry*, and the ex-German mine-laying cruisers *Mulhouse* and *Metz* as well as the destroyers *Buino*, *Delage*, and *Rageot de la Touche* are reported as having about reached the end of their useful life.

MINE SWEEPERS

The following old ex-Argentine destroyers, all of 950 tons displacement and 27 knots speed, have been fitted as mine sweepers and constitute a special division: *Adventurier*, *Intrepide*, *Opiniatre*, and *Temeraire.*

ITALY

(*For notes on mining operations in Italian Navy, see O. N. I. Bulletin for September, 1930.*)

NAVAL MINING OPERATIONS

(A Russian view)

By N. Dorogoff

GENERAL TACTICAL PROPERTIES OF MOORED MINES

Moored mines, the weapon of a weak fleet against a strong one, after having been neglected for a long time, were so much used and perfected during and after the World War that it is hardly to be doubted that they will be very extensively used by all fleets during the next war. The mines used by the Russian fleet were contact mines. We had no noncontact mines like those existing in other countries and whose rôle in the future wars will be perhaps very important.

The contact mines are of two types according to their detonators which are either percussion or electric percussion. We have had experience with both types in the navy and know them well. The question is which type is preferable as both have their qualities and defects. The percussion type has several advantages owing to which we once more adopted that type just before the war instead of the other:

1. Percussion mines can be placed under surface ice and through broken ice, this being a great advantage in our climate and makes it possible to lay mine fields in advance without danger from enemy ships. The author placed such mines under the ice in the Gulf of Finland; with electric percussion mines this would have been risky work.

2. The percussion mine is safer to handle, as no protective caps have to be unscrewed. There is also no danger of a cap being broken while hoisting the mine from the hold or while moving it along the deck, especially at night with bad light or no light at all; the loss of our trawler *Vzriv* was due to a broken detonation cap.

3. The final adjustment of percussion mines is much easier.

4. Percussion mines can be spaced 180 feet apart, which would be too close a distance for electric percussion mines, as the explosion of one mine at a distance of less than 150 feet would put the entire mine field out of action; a closer spacing allows the mines to be placed in two rows instead of three, and this makes the work quicker and easier without reducing their effectiveness.

5. Percussion mines are more difficult to remove, as they are more likely to explode when pulled by the trawl; some of the electric percussion mines often got caught up by the trawl several at a time and are therefore easier to remove. During the late war, the Germans managed to get out our galvanic mines and to lay them again elsewhere. The author also attempted to use the German galvanic mines, and succeeded in dismounting part of them, but soon afterwards the Germans provided their mines with an automatic device that exploded the floating mine at the first attempt to dismount it; since the appearance of that device all attempts to dismount German mines were dropped.

6. Percussion mines better resist destruction by means of countermines and are more dangerous for submarines. On the other hand, galvanic mines are less sensitive to jars on their moorings. Of the two types, the percussion alone can be laid from a ship going at high speed; while both types are equally easily torn from their moorings and equally adapted for accurate placing.

Electric percussion mines are better suited for mass production, the detonators of percussion mines being complicated and requiring precise workmanship and careful adjustment. It is probably owing to this that in this country, as well as abroad, electric percussion mines were preferred during the war, the demand for mines being always greater than the production.

THE EVOLUTION OF THE MOORED MINE

The evolution was rather slow at first owing to the prevailing opinion that moored mines were but a defensive weapon. As soon as they were recognized as offensive weapons, their development went further as the moored mine gradually proved quite insufficient for offensive tactics. In open seas with regular tides, anchored mines became visible and showed on the surface at ebb tide; during the war, trawlers could sweep the mine fields at such times. On the other hand the British mine fields did not prevent German submarines from passing. The appearance of the paravane opened the era of high-speed trawling and the mines of the old types became less efficient. The protecting bow paravanes warded off the mines while the stern paravanes cut the moorings and rapidly swept the field with practically no risk for the ship. On the other hand, the length of the moorings necessary for placing mines at greater depths made the mine too bulky. There appeared a certain limit to the size of the anchor and the size of the mine, as well as to the use of an additional floating anchor, the limit being dictated by the construction of the existing types of ships. All this brought the British to the necessity of devising new types of submarine mines.

The mine had to be sunk deep enough to be out of reach of the paravane; it had also to be able to blow up a ship by exploding at a certain distance from its bottom. We thus come to the idea of noncontact mines that explode when a ship passes them at a short distance.

As yet there are two types of detonators of that kind that may prove efficient—a magnetic detonator and another one activated by the ship's vibration. The former is based on the influence of the magnetic masses of a passing ship upon the magnetic needle in the detonator, that closes the circuit and explodes the mine at a given moment. The vibration detonators are based upon the action of various kinds of waves upon receiver membrane contained in the mine and connected with relays and a series of mechanisms that produce an explosion when a ship passes by. The kind of waves being very different (sound, electric, magnetic, etc.), the noncontact mines can be constructed according to corresponding methods, as acoustic, magnetic, ordinary wireless, etc. The antennæ mines belong to that type. Noncontact mines having first appeared a few years ago and having been but little studied, nevertheless point to tremendous possibilities, since the sole application of wireless waves allows of exploding mine fields at a long range. This shows the important part such mines will undoubtedly play in the next war. Unfortunately we have no statistical data as to the action of noncontact mines upon ships. A short time before the armistice the British had laid an enormous noncontact-mine field against submarines.

As to noncontact river mines we know the bottom magnetic mines laid by the British in the North Dvina River that played their rôle in the Civil War; they prevented shipment of material to Archangel, blew up several trawlers, and could not be trawled out, so that we had to make a side channel on the river to go around that barrier, all attempts to get rid of them in the usual way having naturally proved hopeless. Noncontact floating mines—a masterpiece of mine evolution—will become the most powerful offensive weapon during a battle in open sea.

Closely related to noncontact mines are the anchored floating mines. That idea originated in our fleet just before the war. The mining officer of the *Narova*, M. Kaltcheff, developed a floating mine with a buoyancy near to Zero. His mine of the percussion type and cylindrical in shape, floated at a given depth for several days or a week until its electric energy supply had run out; its time of flotation could be brought down to fractions of an hour. Unfortunately, the inventor perished with the *Akoola* and could not develop

his invention. Later on a floating mine was devised by Captain Kolbassieff, but owing to many defects it never went beyond the experimental stage.

Noncontact mines as well as floating ones fill one of the fundamental requirements—i. e., they are hard to trawl out—the moored noncontact mines are laid at a depth generally not reached by paravanes, while the floating mines can not be caught by the usual trawls and paravanes. There is no doubt that a competition is going on between mines and trawls just as between artillery and armor plating. Since mines take to greater depths, paravanes and trawls will have to be perfected in order to reach the corresponding depths. Floating mines will be opposed by trawling nets. Meanwhile floating mines can not be trawled out, and this is their great advantage over all other types.

The use of anchored mines both for offensive and defensive purposes is still possible in spite of the invention of paravanes and the problem may be solved by other methods than those devised by the British. The mines need not be sunk to depths inaccessible to the paravanes if they are equipped with antitrawl devices. A mine field provided with protecting mines would undoubtedly prove a great obstacle to paravanes, it being possible to make the charges attached to the mine moorings strong enough to break the paravane's cable. There are also other possible devices for protecting the mines.

The practice of war showed that the exploding charge of the existing mines is insufficient, as its explosion does not always disable a modern ship. A few samples from the experience of the Baltic Sea may serve as an illustration. The explosion of mines under the bow of the cruiser *Rurik* and under the stern of the *Letoon* and *Zabiaka* were, luckily for us, not sufficiently strong; the squadron torpedo boat *Amooretz*, the *Ukraina*, torpedo boats *215* and *218*, as well as the trawler *Zapal* were none of them sunk by the mines they hit. The mine layer *Ladoga* floated for three hours after the explosion and was lost owing to her old bulkheads that gave way under the water pressure. All these boats were of obsolete types. The recent boats are well protected against mines by means of bulges consisting of a number of thin partitions, protecting the real outside hull of armor plating—1½-inch thick—at a distance of several feet. Naturally the charge of the older mines is not strong enough for such ships. The evolution of the mines in that direction ought to include greater charges of a stronger explosive, acting at a greater distance. Such explosives are known to chemistry. A further step should consist in a study of the best shape of the mine and in augmenting the charge. In the seventies its weight was 60–80 kilograms; it was brought up to 180 kilograms during the last war. Of

course there is a limit to that weight; therefore the above-mentioned course of looking for a more efficient shape and for a stronger explosive seems to be a rational one.

The most important quality of mines—their quick and easy laying—was first developed since the invention of cup anchors. Our old mines of the 1906 type were replaced by the 1908 type on rollers, and later by the 1912 type that could be laid from any sloping surface, even without rails. The evolution in this respect is evident, but should go further in the direction of attaining still greater speed in laying the mines by using machinery for this purpose.

Let us examine the requirements that mines should have according to the experiences of the war. An ordinary mine should be:

(1) Equally capable of either floating up from the bottom or of staying there as required; the necessary interval between the dropping of two consecutive mines should not exceed 5 seconds. The 5-second interval is not too long, since at a speed of 30 knots it corresponds to a distance of 250 feet between the mines.

(2) The mine should be equipped with a device allowing it when necessary to remain sunk and to lose its exploding quality. Such a device should be as simple as possible. It might be needed, for instance, when a ship with mines on board got under the enemy's fire and would like to get rid of her mines; in such a case the mine should be made harmless.

(3) The speed of the mine-laying ship should in no way interfere with the accuracy of the laying. This is especially important for mines of the non-emerging type, because it is necessary to enable a ship to lay mines while sailing at the highest speed.

(4) Any sort of dissolving safety devices, such as sugar, should be avoided, practice having shown that the sugar plugs in the mines liquefy on board ship in bad weather, thus putting the safety devices out of action before the mines are laid.

(5) The charge should be augmented to 320 kg. or else a stronger explosive be used, in order to make a single explosion sufficient to sink a ship.

(6) The interval required by the mine to detach itself from its anchor and become dangerous should be made subject to regulation, if possible, within limits from one-half hour to 15 days. This is necessary in order to make the mines rise to position some time after they have been laid and not all at once but at different times which would make it more difficult for the enemy to trawl them out.

(7) All mines should have sinking devices for the above-stated reasons.

(8) It would be desirable to provide the mine with a device which would permit it to be used as a protective mine. This is necessary, because it makes the trawling difficult even with paravanes provided the other mines come up quick enough; also, because duplex and triplex mines make it difficult to force a line consisting of them. The idea of duplex and triplex mines is a very valuable one. The anchor of a triplex mine has a device causing a second mine to float up as soon as the first one has been trawled out. After the second one has been destroyed, a third one comes up which can blow up the ship coming on behind the line of trawlers. The fact that clock works sometimes proved unreliable should not lead us to abandon the idea of watch mines or time fuses. The invention of a new type of mine just before the

war proved disappointing. The inventor brought some samples on board the *Ladoga* for trial, but the author refused to accept them owing to the defects of their clockwork, which could not be corrected on board. Moreover, the clockwork was not mounted either on Cardan rings or springs, so that there was no assurance that they would still work after another casting. However, the idea of the sugar isolator when applied to these mines enabled us to use them during the World War and the Civil War.

We may now imagine what an ideal mine should be capable of if such an ideal were attainable. Such a mine should be suitable for use at any time and from any kind of ship and should be effective:

(1) Against trawlers and other light craft (by sinking them) while being itself safe from being trawled out and even from detection.

(2) Against large battleships, either sinking them or disabling them for a long time.

(3) Against submarines by sinking them when approaching.

(4) Against enemy counter mines by being safe from their explosion at the shortest distance allowed by the material of which the mine is constructed. Besides, such a mine should have all the generally required qualities; it should be easily and safely operated, invisible in water, etc. Such a mine does not yet exist but the navies of all countries will surely endeavor to create a weapon of that sort.

IMPORTANCE OF MINES AS COMPARED WITH OTHER OFFENSIVE WEAPONS

The Japanese were among the first to take advantage of the possibilities afforded by mines and laid great numbers of them in front of our stations in Port Arthur and Vladivostok, blowing up the *Petropavlovsk* and damaging the *Podieda*, *Savastopol*, *Baian*, *Gromoboy*, and many other smaller ships. On the other hand the loss of the best Japanese battleships, *Hatsuse* and *Yashima*, on our mine fields, pointed to the importance of mines as an offensive weapon.

Before the European war the naval experts of England, Germany, and France kept thinking that supremacy on the sea would be obtained by artillery battles far from the coasts where mines could not be used; therefore no great attention was given to improvements in that branch. When the war broke out, the powerful fleets of England, France, and Germany were far from being well equipped in that respect; their mines were primitive—both the construction and the methods of using them were deficient. There was also a lack of ships adapted for mine laying and of personnel trained to their use. The deficiency of England in that respect was so great that even our own country, poor in resources as it was, had to send 1,000 mines to England from our Vladivostok supplies as well as experts from our mine-laying squadron, with Averkieff among others, in order to acquaint the British with our mining system. Of course the British knew of our experience in the Jap-

anese war, of our extensive mining organization as well as of the adaptation of Germany Navy and merchant ships for mine laying. All this was of course an open secret; but the idea was that mines were the weapon of a weak navy and it was only during the war that a new point of view was adopted and mines came to be extensively used by the British. Much energy was displayed by them; after entering the war with practically no mines at all, they managed to adapt 980 factories for that sort of work, turned out hundreds of thousands of mines, worked out in theory and practice the mining technique, developed new types, and constructed at Portmouth a trial tank in which the working of mines and their anchors could readily be observed and studied.

Luckily for us, the experience of the Japanese war had taught us a few things, one of them being that our backwardness in technical questions would not allow us to match the German line fleet. The defense of our country's coasts in the future war would have to be based upon the efficiency of our mining technique. A plan was being worked out since November, 1906. The carrying out of that plan took several years and developed as follows:

In 1907 a series of mine depots were organized in Cronstadt, Sebastopol, and Vladivostok. Floating depots were installed on the mine transports *Amoor*, *Jenessei*, and *Volga* in the Baltic, on the *Boog* and *Doonai* in the Black Sea, and on the *Mongoogai* in Vladivostok. In 1908, special mining officers were commissioned to take charge of the mining service in the ports with a corresponding personnel under them. That organization being only adapted for coast defense, it soon became clear that it would have to be extended so as to allow of mining operations of an offensive character. In 1908 the general staff of the navy appointed the chief of naval forces as chief of the entire mining service. The organization consisted of two branches, namely the squadrons mining service under the orders of the flag officers in command, and the ports service under the orders of the commander of ports. The next step in the development of that scheme was the creation of a mine-laying squadron according to the idea of Admiral Essen, the author of the whole plan. That remarkable organizer had worked out in detail the plan of a mining defense of the Baltic Sea and of the approaches to the capital in case of war, and the main endeavors of the navy, the Admiralty, and the naval factories were concentrated in that direction. The admiral created his squadron of mine layers where that branch was specially studied, experimented in, and improved under practical conditions, and officers and crews were intensively trained in laying both war mines and dummies. Admiral Essen inspected the squadron at the

end of each summer campaign and personally investigated the efficiency of the personnel's work in accordance with his plan. The fleet maneuvers always included mine layers, and mine-laying operations were carried out by the entire fleet. In a word, his object was to train the squadron in such a way that an extensive mine operation in case of war would represent nothing unusual for the squadron—nothing more than a summing up of all its activities and the execution of a well-known, habitual work. Only those who sailed with the mine-laying squadron during the years that preceded the war can realize what an enormous amount of work had been done in order to obtain the high perfection in mine laying which we had achieved toward the outbreak of the war.

The entire plan of defense and the training of the fleet centered upon the idea of using the force of mine fields by compelling the enemy to conduct the battle over them. In case of the enemy breaking through, our fleet was to retreat—laying mines along its course—upon the second line of mine fields protected by the fire of coast batteries. This was the only way for our weak naval forces to contend with a powerful enemy fleet.

The admiral was right. When the war broke out in July, 1914, and it was expected that the German fleet would appear before Cronstadt in order to begin landing operations, the mine-laying squadron carried out its task and at once laid the first line of mine fields according to Essen's plan. After the central and secondary fields had been laid, the brilliant results of the plan could be felt during four years of war. There exists an opinion that mine laying is not hard to learn, that it can be taught to every ship's crew, and that any sort of craft can be used for it, such as trawlers, cruisers, and torpedo boats. But there is one thing that the opponents of special mine layers do not realize and that is that even with special mine layers there is a great percentage of too deeply placed or altogether sunken mines. We know this from our entire five years' practice on the squadron when we had barely time enough to get through with our program before the close of navigation for the year. Good care and management of mine supplies are only then guaranteed when the responsibility for them rests upon the men who are going to use them. Each mine should be tested by one laying at least; they all require constant inspection and periodical testing, otherwise they may easily become worthless ballast to be thrown overboard. The author of this article was sent during the war to supervise the mine-laying operation conducted by the *Rurik* off the German coast. The ship's officers resented the arrival of what they called "teachers" from the special squadron. They were, however, somewhat embarrassed when I had

to readjust all of the 120 mechanisms that had been set on the wrong mark so that when laid the sinking valves of the mines would have been set out of action. Of course, the mistake concerned a mere detail, but the entire mining technique consists of such details, the neglect of which often leads to the loss of the ship and of her crew.

Disregard of mining may lead to serious strategical mistakes as it happened, for instance, in the Black Sea at the beginning of the war. While Essen was systematically carrying out his plan of mining defense in the Baltic, the commander of the Black Sea Fleet did not believe in the efficiency of mine fields. After the *Goeben* and *Breslau* had arrived at Constantinople bringing German officers and crews for the Turkish fleet, it became evident that Turkey was going to enter the war, and that the entrance into the Black Sea should be blocked at once and the coasts protected with mines. Such a protection not having been prepared in advance, the story of Port Arthur was nearly repeated. On October 28, just upon the day when the diplomatic relations with Turkey were broken, the mine layer *Proot* was sent over from Sebastopol to Yalta to bring over a battalion of infantry. A mine layer is not a transport ship, and it would have been wiser to have used it first for its intended purpose; but this was not done. Next day the *Goeben* came up to Sebastopol, bombarded the place, and went back unharmed by the coast artillery. She could not have done this had there been fields of automatic mines laid in the Bosphorus and at Sebastopol. On the same day, the mine layer *Proot* was returning to Sebastopol with 750 mines on board. She was met by the *Goeben* and sunk.

On October 29 the Turkish torpedo boats *Gairet* and *Nuavenet* were ordered to enter the harbor of Odessa and to destroy all the warships lying there, namely, the gunboats *Donetze* and *Koobanetz* and the mine layers *Doonai* and *Beshtau*. Had there been a mine field near Odessa, the operation would have had the same results as those experienced by German cruisers (of our *Novik* type) on our first line of mines (in the Baltic). However, there was no mine defense laid near Odessa. The torpedo boats approached under cover of a dark night and were mistaken for our own torpedo boats of the *Shestakoff* type. They quietly rounded the mole, entered the harbor, sunk the *Donetze*, disabled a gun on the *Koobanetz*, sunk a tug that tried to ram them, a torpedo boat, shelled the whole harbor, and sailed out after having spent a whole hour in the harbor, according to German accounts. (The author does not mention the fact that the *Goeben* at Sebastopol passed over a field of electric mines operated from the shore; the current happened to be switched off at the time, either because the *Proot* was expected back or for some other reason.)

A comparison between the beginning of the war in the Baltic and in the Black Sea seems to show once more the importance of mines among other weapons of naval warfare.

TACTICAL USE OF MINES ACCORDING TO THE LESSONS OF THE WAR

Let us now add a few words on the use of mine fields. They are of two kinds—protected and unprotected. They can also be subdivided into—

(1) Position mine fields.
(2) Defensive.
(3) Active.
(4) Maneuvering mines.

The first category includes the fields laid in view of providing a battle position where the enemy fleet can be engaged under protection of the mine field. Position mine fields were laid by the Baltic Fleet as follows: Centrally between Nargen and Porkalaud, on a frontal position north from Dago, and at Irben near the entrance of the Gulf of Riga. The author personally took part in laying the central mine fields in front of Cronstadt which protected the capital during the civil war. That kind of mine defense had been rather extensively worked out by our navy some time before the war. Position mine fields should answer to the following requirements:

(1) Reliability.
(2) Safety for our own forces; in other words, absence of loose mines rising to the surface.
(3) Close spacing in several lines.
(4) Sufficient width of the field, permitting bombardment of the trawlers.
(5) The presence in front of them of "whiskers"; i. e., transverse lines of mines.
(6) Permanence of the fields.

All these conditions, of course, remain in force after the experiences of the war.

There is another interesting question. Do position mine fields still present a serious obstacle to a fleet after the introduction of fast trawling paravanes? At the international trawling conference of 1922, in which the author took part, one of the representatives stated that our central mine field in the Baltic had been partly trawled out and that the new methods of trawling allow of its being passed easily and without danger. The question is a very important one and it should be openly stated that positions protected by moored mines are no longer as safe as they used to be. However, there are also new types of contact and noncontact mines that should still make it possible for a weak Navy to defend its waters with mine fields of a new type, placed under cover of coast batteries and protected by submarines.

The question of position mine fields is complicated by the fact that such a defense should present, as far as possible, an unsurmountable obstacle, not only for large vessels equipped with paravanes but also for submarines and shallow draft trawlers. It should also be safe from destruction by countermines dropped by vessels or aircraft. We are not going to show what mines and combinations of mines should be used for that purpose, this being an entirely new subject; we are only going to show how a mine field should be made impassable for submarines. The evolution of mining technique indicates the use of three types of mines for this purpose:

(1) A type for use on a vertical screen.

(2) A 1-mile system activated upon contact of the boat with any point of the mine's mooring.

(3) Magnetic mines.

These three types ought to be quite new ones and require the use of the latest technical improvements. The first type—the vertical screen—should consist of two parallel planes so spaced that a submarine could not pass without touching at least one of the mines. The drawback of this type is the difficulty of laying and the great number of mines required.

The second type represents a mine that should sink as soon as a submarine touches the mooring, and sink rapidly enough so as not to let the submarine pass under it. The mine should also explode as soon as it sinks to the depth of the submarine, even without coming in contact with the latter. Such mines should be placed in one or two rows so that the submarine could not escape contact with one of the moorings. The construction would be a complicated one, but the difficulties could be overcome as they already have been in the case of magnetic mines. The latter should have a long range of action, up to 100 feet, and should be placed at middle depth; their construction should make them explode at the approach of a submarine either above or below or at a level with them. Fields of that kind would require a comparatively small number of mines with a tremendously powerful charge. The drawbacks of that type are (1) a somewhat complicated construction and (2) the probability of danger from them not only for submarines but for any large ship as well, since even a small difference in distance can cause a large and a small ship to exercise an equal amount of magnetic action.

The above short study shows that the question of laying a mine field is a complex one. We think that an up-to-date field should not be limited to mines of one and the same type, calculated for large ships only, but should represent a screen consisting of mixed types laid in various combinations and at different depths, so as to be effective against ships of different kinds. It is practically impossible

to keep their location secret, as was the rule before the war, so it is much better to announce it as both the British and Germans have done. It should be added that all measures ought to be taken in order to make the mines become harmless as soon as they float up to the surface; in other words, to provide them with sinking valves preventing them from floating up at all.

ACTIVE MINE FIELDS

That type was the one most widely used during the European war. It it a mine field laid off the enemy coast across the probable courses taken by the enemy ships. There does not seem to have been one maritime country that did not use such mine fields, to some extent at least. The importance of that type was first realized during the Russo-Japanese war. Our success on May 1, 1904, when the Japanese warships *Hatsuse* and *Yashima* were sunk, might have reversed the results of the war had we made the most of it. The Germans were the first to make extensive use of active mine fields against both the war ships and merchant ships of the Allies.

While protective mine fields require no secrecy, active fields (in order to be effective) must be secretly and quickly laid. They do not require a great quantity of mines, as one or two can sometimes have the same effect as a greater number, whereas a large field when not protected by coast-artillery fire is bound to be trawled out or destroyed. The Germans scattered mines at random everywhere along the routes of ships, near Bombay, Singapore, off Gogland where the *Rurik* was mined, and Dakar. Besides ordinary mines, they also laid mines provided with retarders that only became dangerous several days after having been laid, thus creating for some time an impression of safety. Such mine fields can be laid from mine layers, submarines, torpedo boats, cruisers, and merchant boats. The Germans managed to use small Finnish sailing craft. The Allies were obliged to regard all seas with a depth under 200 fathoms as dangerous and to sweep them for mines. During 1915–16 the Allies destroyed yearly about 2,500 mines and 4,261 in 1917.

Active mine fields in front of the chief ports and on strategical routes and issues near the enemy's coasts can be laid under the following conditions: (1) The mine-laying ships should be capable of sailing not less than 25 knots; (2) good information by wireless as to the whereabouts of the enemy's forces; (3) a good choice of routes where merchant vessels are less likely to be encountered. By partly applying the above rules, even our slow mine layers and cruisers managed successfully to mine the German coasts. Our cruisers in the Baltic laid mine fields in 1914 and 1915; our torpedo boats did the same near Danzig, Memel, and Steinort in 1916.

The Germans began the war with England by sending the auxiliary mine layer *Koenigin Luise* into the Thames, where she laid mines upon which the cruiser *Amphion* was blown up two days later. As early as 1915 Admiral Jellicoe insisted before the Admiralty upon the necessity of more mining operations in the Bay of Helgoland stating incidentally that the British types of mines could not be relied upon to give good results against submarines. The German active mine fields and the danger from submarines prompted the British to move their naval base and to keep their navy in the northern part of the North Sea. It should also be remembered that the famous *Goeben* and *Breslau*, that had been fought by all the artillery of the Black Sea Fleet, were first disabled by mines.

MANEUVER MINING

While the part played by active mining was clearly defined during the last war, maneuver mining still presents but a theoretical interest, since, unfortunately, there has been no artillery battle with simultaneous mine laying. We think that the reason of this is that the essential condition for such an operation is the use of fast mine layers. The German naval commander says in his war notes:

> I had no fast mine layers besides the *Albatross* and the *Nautilus* whose speed was fairly sufficient near the enemy's coasts (20 knots). I only had adapted steamers with speeds of 14 knots and under. Of such steamers only three were provided for the North and Baltic Seas. The next three were only got ready during the first year of the war, and their inferior seagoing qualities made them useless in the North Sea.

In England things were not much better. The old cruisers of the *Apollo* type (3,400 tons and 20 knots) had been reconstructed and turned into mine layers. The fast mine layer *Abdiel*, that took part in the Battle of Jutland, had been reconstructed in answer to the laying of the keel of 12 German cruisers of the *Brummer* type with a projected speed of 35 knots. France and Russia had no fast mine layers. Naturally it is useless to employ slow mine layers in connection with maneuvers of fast battleships.

The advent of anchorless contactless mines equipped with retarders (time fuzes) that can be laid in deep waters and rise into position within a definite time after having been laid should make it possible to engage in action outside of previously laid mine fields, as in open waters, well in front of the fields protected by coast batteries.

Similarly to what we see in warfare on land, where a series of defended positions precede the main line of fortresses, the defense in naval warfare can not be based only upon decisive action at sea nor depend solely upon one or two lines of defense. The principle accepted before the last war was that in a naval battle all the forces

should be brought into action at once, the first successful blow being decisive for the issue of the battle. This principle only holds good for a fleet of such an overwhelming power that there can be no doubt as to the ultimate issue. It could be done by Nelson; it could also be done by Togo when facing Rozhdestvensky's weak squadron, but it was not the case with the British forces when acting against the German fleet that held its own until the end of the World War and remained unvanquished.

When the engaged forces are weaker or equal to the enemy's, a strategical preparation of the battle serves to balance the opposed forces. Maneuver-mining operations may here play a tremendous part. Mine fields may be made to represent frontal positions against which the enemy can be driven; preliminary engagements can be so conducted as to compel the enemy to put to definite courses where the issue of the artillery battle is sure to be to his disadvantage. Of course, this is not easy to do, but it can be done.

In order to draw the enemy upon a mine field laid during the battle or to rapidly scatter mines either across the course of the retiring enemy or to cover one's own retreat it is necessary to have fast surface and submarine mine layers. We thus come to the question of devising a mine layer that would be able to sustain for a long time the fire of the cruisers and torpedo boats of the enemy squadron. Cruisers reconstructed into mine layers as well as mine-laying torpedo boats are nothing but a compromise and do not answer the problem of maneuver mining. The problem itself can be resumed as follows: The lines of mines should be laid so as to act for a definite time and at a speed of 35 knots sailing under the enemy's fire and over very extensive areas. The mines should be of the submerged floating type and should stay charged for a limited time, after which they should automatically either sink or become harmless. It is most probable that in future wars an unprecedented amount of maneuvering will take place in order to make a better use of mines and submarines. If we assume mines to be the third weapon of battle and to be as important as the other two—i. e., artillery and automobile torpedoes—we will see that a special type of ship is required for the use of that weapon, namely, a mine layer capable of the greatest speeds.

Such a ship can now be imagined according to the theoretical requirements it should fulfill. It should carry no less than 400 mines conveyed to the stern on motor-driven trolleys in lots of 40–50. The mines should be cast mechanically, special devices being provided, making impossible the casting of more than one mine at a time. An electric counter should register on the bridge the number of mines laid. All this is realized on the British mine layer *Wahine*. The

supply of mines should be stored in protected holds running along the entire ship's length, where they can be easily inspected and made ready. The action of mine laying should not be apparent while going on. The armor and artillery should afford sufficient protection from cruisers and torpedo boats, the excess of weight owing to mines and armor being made up for by lighter artillery.

Such is the type of a maneuvering mine layer, roughly outlined. On the other hand, submarine mine layers can also be used in certain cases—i. e., for laying mines across the enemy's expected line of retreat. During the war the British fast mine layer *Addiel* was used to lay mines on the way of retreat of the German fleet during the Jutland battle. It is also supposed that during that battle the German fleet intended to use maneuver mining and that the battle plan was partly based upon an operation of that kind.

The above article should not be taken as a detailed study of some of the defects of mines, but rather as an attempt to point out the probable direction that the evolution of mining technique is likely to follow.

CURRENT ARTICLES OF PROFESSIONAL INTEREST

This Freedom—For the Philippines. By Sherwood Eddy. (World's Work, October, 1930.) AP2 W92

American Recognition of Russia: What It Would Mean to Europe. By Paul Scheffer. (Foreign Affairs, October, 1930.) AP2 F71

Government Subsidies in Japan. By Herbert M. Bratter. (Foreign Affairs, October, 1930.) AP2 F71

Italian Penetration of the Balkans. By V. K. Sugareff. (Current History, November, 1930.) D501.1 N53

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GENERAL NAVAL NOTES

BRITISH EMPIRE

STATUS OF FIVE CAPITAL SHIPS AFFECTED BY LONDON NAVAL TREATY

During the course of parliamentary debates in the House of Commons on November 26, 1930, the following information was given relative to the present status of British capital ships affected by the London naval treaty: *Iron Duke*, *Benbow*, *Emperor of India*, *Marlborough*, *Tiger*.

The *Iron Duke*, which, under the treaty, may be retained for training purposes if demilitarized, is at present so used and will be demilitarized in due course. The *Benbow* has already been paid off and is being prepared for sale; and orders have been given for the *Emperor of India* to be paid off also, preparatory to her disposal. There is a good deal of work to be carried out by the dock yards on the ships before they can be handed over to the shipbreakers, but it is anticipated that the remaining two vessels—the *Marlborough* and the *Tiger* will be paid off within six months.

BRITISH 1930 BUILDING PROGRAM

The 1930 British naval-building program comprises:

Three 6-inch cruisers.
One destroyer leader.
Eight destroyers.
Three submarines (including one minelaying).
Four sloops.
One net layer.

The following names have been assigned to the above vessels:

Light cruisers:
- *Neptune* (to be built at Portsmouth).
- *Orion* (to be built at Devonport).
- *Achilles* (to be built by private contract).

It is understood that the above cruisers will follow closely the design of the *Leander* of the 1929 program now under construction at Devonport.

Destroyer leader:
- *Duncan* (to be built at Portsmouth).

Destroyers:
- *Defender, Daring, Diamond, Delight, Dainty, Diana, Duchess*, and *Decoy*, all of which are to be built by private contract. They will be known as the *Defender* class.

Submarines:
Starfish (to be built at Chatham).
Seahorse (to be built at Chatham).
Porpoise (mine layer, to be built by private contract).
Sloops:
Falmouth, Millford, Weston-Super-Mare (to be built at Devonport).
Dundee (to be built at Chatham).
Net layer:
Guardian (to be built at Chatham).

In referring to the above program a British press report states that "It is estimated that the program will involve an expenditure of about £9,000,000, to be spread over three years. The cruisers will cost between £1,000,000 and £1,500,000 each, and will take from two to three years to build. Each of the destroyers will cost about £200,000."

NEW BRITISH 6-INCH CRUISERS—"LEANDER" CLASS

Following are some recent notes on the latest 6-inch British cruisers of the *Leander* class, displacement approximately 6,500 standard tons, legend speed 35 knots. The first vessel of this class, the *Leander*, included in the 1929 program, was laid down at H. M. Dockyard at Devonport on September 8, 1930. Three additional vessels of this class were included in the 1930 program. Orders for two, the *Neptune* and *Orion*, have recently been placed with H. M. Dockyards at Portsmouth and Devonport, respectively, and the contract for the hull and engines of the third, the *Achilles*, has recently been awarded to Messrs. Cammell, Laird & Co., (Ltd.), of Birkenhead, Liverpool. Press reports state that orders for the machinery of the *Neptune* and *Orion* have been placed with Parsons Marine Steam Turbine Co. (Ltd.), of Wallsend-on-Tyne and with Vickers-Armstrongs (Ltd.).

Protection.—It is believed that the protection of these vessels is at least sufficient to insure against penetration by 4.7-inch shells of existing destroyer batteries, which are reputed to have an effective maximum range of about 18,000 yards. It is understood that one school of British thought holds strongly the opinion that any armor protection which is not adequate to at least the degree of protection indicated above, i. e., against the strongest existing destroyer batteries, is entirely wasted.

It appears that these 4 vessels are somewhat similar to our 10 *Richmonds*, except for the fact that in all probability substantial protection, at least in way of magazines if not in way of machinery space and battery proper, has been secured in the British design at the expense of a maximum of four 6-inch guns and also with

due consideration to the reported improved ballistics of the British 6-inch gun.

Single smokestack.—The reported adoption of a single smokestack in the *Leander* class follows the fashion for the new French 10,000-ton cruiser *Algerie* laid down at Brest in December, 1930, and the recent Italian-constructed Argentine cruisers.

The usually well-informed naval correspondent of the London Daily Telegraph comments as follows upon the new 6-inch British cruisers:

> The first of a new class which supersedes the 10,000-ton Washington treaty type and is intended chiefly for trade protection on the high seas, *Leander* represents an advanced stage in cruiser design. This is 2 knots above the speed of any previous British cruiser and, contrary to the practice prevailing abroad, it is to be achieved when the ship has her full armament and war stores on board.
>
> In appearance *Leander* will strike an entirely new note. Our present cruisers have three funnels; but in the new vessel all the uptakes from the oil-burning boilers are laid in the one huge smokestack placed nearly amidships. This arrangement has the double advantage of reducing target area and increasing the amount of free deck space.
>
> Even more striking is the armament of the new ship. This will consist of eight 6-inch quick firing guns of a new high-velocity model, mounted in twin turrets at bow and stern. In previous cruisers, as also in the two *Nelson* battleships, the guns have a maximum elevation of 30°, but *Leander's* 5-inch weapon can be fired at any elevation up to 70°. This arrangement not only gives the guns enormous range but enables them to be used against aircraft as well as surface targets.
>
> No other warship in existence has such a high angle of fire from its main armament. Besides her eight 6-inch guns, *Leander* will have a battery of small antiaircraft guns and torpedo tubes. She is to carry two airplanes on catapults. Unlike the rather flimsy and very vulnerable cruisers now building abroad, the new British cruiser will have substantial armor protection over her vital parts.

DEPLOYMENT OF GRAND FLEET AT JUTLAND

The subject of Admiral Jellicoe's deployment of the grand fleet at Jutland again echoes in the following comment quoted from a recent edition of the Naval and Military Record (London):

> If there is one phase of the Battle of Jutland which, more than any other, has been the subject of controversy, it is the deployment of the Grand Fleet into fighting array; whether Admiral Jellicoe waited too long before forming his line, and whether, when he ordered the general signal to be made, his decision as to direction was the right one. It is not improbable that this contentious subject will crop up again in consequence of some remarks made by the deputy chief of the naval staff in the course of a speech at a banquet he was attending.

Vice Admiral Dreyer, who was flag captain to Admiral Jellicoe at Jutland, stated that "he took only 50 or 60 seconds to decide how to deploy the British fleet, and events proved that his decision was the right one." This is very interesting, but it still leaves open the point of when Admiral Jellicoe made up his mind. He himself says in his Reflections on the Battle of Jutland (The Grand Fleet, p. 405): "It has been mentioned that the circumstances of the meeting made it very difficult to ascertain with any degree of certainty the disposition of the enemy's battle fleet, and the deployment of our own fleet took place under these conditions."

In point of fact, Admiral Jellicoe records that it was at 6.16 p. m. he ordered the signal to the Battle Fleet "to form line of battle on the port wing column." At 6.6 p. m., he says, the conviction was "forming in my mind that I should strike the enemy's battle fleet on a bearing a little on the starboard bow, and in order to be prepared for development I turned the fleet to a southeast course." Speaking of a few minutes later, he says: "The point for decision was whether to form line of battle on the starboard or port wing column. My first and natural impulse was to form on the starboard wing column in order to bring the fleet into action at the earliest possible moment." There is an admission of an uncertainty here covering a period of 10 minutes. Hence, we venture to believe that what Vice Admiral Dreyer really meant to convey was that it was at the end of this 10 minutes of uncertainty that Admiral Jellicoe "took only 50 or 60 seconds to decide how to deploy." It has been argued that the Grand Fleet should have been deployed into line before it came into contact with the German fleet at all, which is tantamount to advocating a complete disregard for the opening tactics of the other side.

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JAPAN

FUNNELS OF 1,700-TON DESTROYERS TO BE LENGTHENED

By way of experiment, the funnels of the destroyer *Shirayuki* (1,700 tons displacement) were lengthened 39.37 inches. A comparative study showed that this measure gave better combustion and resulted in economy in fuel consumption. In view of the good results obtained it has been decided to lengthen by same amount the funnels of all destroyers of the *Shirayuki* class, this work to be completed at once.

NOTES ON NEW VESSELS

The 10,000-ton cruiser *Maya*, laid down in 1928, was launched at the Kawasaki Dockyards, Kobe, on November 8, 1930.

The 1,700-ton destroyers *Akebono* and *Oboro* were launched on November 7 and 8 at Osaka and Sasebo, respectively, the *Oboro* having been laid down on November 29, 1929.

The destroyer *Yugiri* (1,700 tons) was completed and placed in commission at the Maidzuru Navy Yard on December 3, 1930.

FRANCE

NAMES ASSIGNED VESSELS OF 1929 FRENCH PROGRAM

The following names have been assigned to vessels of the 1929 program:

Six 2,700-ton destroyer: *Vauquelin*, *Kersaint*, *Cassard*, *Tartu*, *Breze*, *Chevalier-Paul.*

Six 1,600-ton submarines: *Conquerant*, *Tonnant*, *Heros*, *Espoir*, *Centaure* (one name unknown).

One 900-ton submarine mine layer: *Diamant.*

Four 640-ton submarines: *Vestale*, *Psyche*, *Sultane*, *Sybille.*

Two 2,500-ton motor gunboats: *D'Entrecasteaux* and *Savorgnan.*

One mine layer cruiser: *Emile Bertin.*

ITALY

FULL POWER TRIALS OF CRUISER "ALBERICO DA BARBIANO"

The cruiser *Alberico Da Barbiano*, of the Condottieri class, has completed her 8-hour full-power trials. Initial displacement, 5,608 tons; average speed for eight hours, 39.742 miles per hour; average speed for 9 runs over a base course of 20 miles, 39.818 miles per hour. In a run over a base course of 16 miles the ship maintained an average speed of 42.048 miles per hour, with a horsepower of 125,000. This is claimed to be a record for a vessel with two shafts. She was designed by the Ministry of Marine and built by Ansaldo. Her turbines are of Belluzzo type.

PORTUGAL

PORTUGUESE NAVAL BUILDING PROGRAM

The Portuguese Government is reported as having finally authorized the construction of the first part of a new naval building program. To initiate the project, it is proposed to allot a sum of $2,000,000, part of which is already available in the surplus derived from the last budget. The Portuguese Ministry of Marine sent out bids on December 2, 1930, to 25 British, Dutch, French, and Italian yards and 1 Portuguese yard. All bids must be tendered before February 2, 1931. It is the intention of the Portuguese Government, with a view to employing Portuguese labor, to have the foreign companies awarded the contracts construct the ships in Portuguese shipyards in so far as possible. For this purpose

shipyards, especially the arsenal at Lisbon, will be leased to the contractors. It is understood that specifications call for the completion of the first part of the building program within a period of three years.

The following is the first part of the building program:

Two gunboats (first-class scouts):
- Displacement, 2,000 tons.
- Speed, 17–18 knots; radius 10,000 miles at 10 knots.
- Engines: Two Diesel engines.
- Battery: Four 5-inch (two forward and two aft); two 3-inch; four 1.5-inch "pom pom" guns; also a complete fire-control system.
- Mines: Two—350 pounds explosives.
- Airplanes: One or two.

Two gunboats (second-class scouts):
- Displacement, 1,000 tons.
- Speed, 16–17 knots; radius, 8,000 miles at 10 knots.
- Engines: Two Diesel engines.
- Battery: Two 5-inch (one forward and one aft); two 3-inch; four 1.5-inch inch "pom pom" guns; also simple fire-control system.

Four destroyers:
- Displacement, 1,400–1,500 tons.
- Speed, 34 knots; radius, 4,000 miles at 15 knots.
- Engines: Steam turbines.
- Battery: Four 5-inch; one 3-inch; two 1.4-inch "pom pom" guns; six 21-inch triple torpedo tubes; also complete fire-control system.
- Mines, 20; 400 pounds explosives; two mine-laying devices; 12–16 depth charges.

Two submarines:
- Displacement: 750 tons, surface; maximum submerging depth, 300 feet.
- Speed: Surface, 16 knots; submerged, 9 knots; radius, 6,000 miles at 10 knots.
- Battery: One 4-inch; one 1-inch "pom pom" guns; six 21-inch torpedo tubes—four forward and two aft; stowage for 10 torpedoes.

One airplane carrier:
- Displacement, 6,000 tons.
- Speed, 14 knots; radius, 10,000 miles at 10 knots.
- Battery: Two 5-inch; four 3-inch; six 1.5-inch "pom pom" guns.
- Aviation: 6 hangars to accommodate 1 hydroplane each with wings folded; stowage for 6 reserve planes. Hydroplanes to be equipped with 2 double machine guns; 2–4 100-pound bombs; camera and radio outfit.

The airplane carrier is also to have storage space for gas and oil for all aircraft; 1 catapult; equipment for raising and lowering 3 hydroplanes, repair shops, a photographic laboratory, meteorological station, pigeon house, storage space for 500 bombs and for 200,000 rounds of machine-gun ammunition. Quarters for aviation personnel sufficient for 12 pilots, 1 mechanical engineer, 12 petty-

officer mechanics, 5 other petty officers, and 15 seamen mechanics and helpers.

All 3-inch guns mentioned above are capable of antiaircraft fire. Main battery guns given above as 5-inch may in all probability be only 4.5-inch. Present information is conflicting.

NEW PORTUGUESE NAVAL ARSENAL

A new naval arsenal is being constructed at Alfeits about opposite Lisbon, on the south bank of the Tagus River. It is reported that this establishment is being built by Germany, its cost being credited to the war reparation account. It is expected that the project will be completed in 1933, when it is proposed to transfer to the new arsenal all naval activities of the present Lisbon Naval Yard.

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POLAND

FRANCE BUILDS TWO DESTROYERS FOR POLAND

The two 1,540-ton, 33-knot destroyers *Burza* and *Wicher*, built in France, have recently been delivered to Poland. Their 5.1-inch guns make them superior to all other destroyers in the Baltic.

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TURKEY

TURKISH MOTOR GUNBOAT LAUNCHED AT VENICE

On December 2, 1930, one of the three motor gunboats being built in Italy for the Turkish Government was launched at the S. V. A. N. Boat Works in Venice. This is a private plant engaged exclusively in government work. The following information has been published regarding this vessel:

Speed: 34 miles per hour.
Battery: One 3-inch/40; One 20-mm. automatic; Two 18-inch torpedoes; One towing torpedo; 10 depth charges.
Complement: 2 officers, 3 mechanics, 7 seamen.
Radius of action: 600 miles.
Radio: Marconi—range 200 miles.
Propulsion motors: Isotta Fraschini.
Marelli dynamo driven by gasoline motor.

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CHILE

CHILEAN AVIATORS TO RECEIVE TRAINING IN ENGLAND

It is reported that the Chilean Air Ministry has accepted the invitation of Great Britain for two Chilean aviators to join the Royal Air Force for the purpose of studying British aviation methods.

PROGRESS OF BRITISH REPAIRS ON CHILEAN BATTLESHIP "ALMIRANTE LATORRE"

The Chilean battleship *Almirante Latorre*, which since July, 1929, has been undergoing extensive alterations and repairs at the Devonport (England) Dockyard, has recently been moved out of the floating dock preparatory to conducting her official trials, scheduled for this month (December). The Chilean crew has arrived in England, and it is reported that the vessel is due to return to Valpariso early in 1931.

AVIATION NOTES

BRITISH EMPIRE

LANDING SEAPLANES ON CARRIERS

It is understood that the British have been conducting experiments with landing float type seaplanes on carriers without the use of amphibian gear. It appears that one school of British opinion holds that a seaplane float need not be any heavier to withstand the stress of landing on a carrier without amphibian gear than the conventional float type seaplane carrying amphibian gear.

These experiments are designed to investigate the possibility of landing on carriers much larger twin-engined seaplanes without using amphibian gear; it is understood that the Admiralty are inclining to the view that a reasonably large twin-engined seaplane should be capable of landing on a carrier because of the difficulty of making it seaworthy enough to withstand sea and weather conditions to which it might be subjected.

It is also understood that the Admiralty has recently requested the Air Ministry to develop and test out some form of arresting gear for landing landplanes on carriers. It would thus appear that the Admiralty do not consider as satisfactory the present procedure of landing on carriers land type planes without any arresting gear. A continuing effort is being made to develop suitable brakes for installation on carrier landplanes. However, but few of the British seaplanes at present assigned to carriers are equipped with brakes.

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JAPAN

BRITISH AIR FORCE OFFICERS TO INSTRUCT JAPANESE AVIATORS

Recent reports from Japan state that two British Air Force officers engaged as instructors at Yokosuka air station arrived in Japan on November 6, 1930. It is understood that these two officers are to teach air tactics and air raiding from November, 1930, to March, 1931.

PROPOSED INCREASE IN AIR SQUADRONS

Following are reported particulars of the squadrons and types of planes to be established under the naval-aviation expansion program over the period 1931 to 1938:

1 squadron of large-sized flying boats (for the present 2 boats to a squadron); 7,200 horsepower, engined with 6 or 7 engines, capable of a continuous flight of 2,000 miles; speed, 125 knots; crew of 20; capacity, 10 tons of either bombs or torpedoes; mounted with 24 machine guns, twin mounted.
3 squadrons of medium-sized flying boats, bombing and reconnaissance; each squadron to consist of 4 in active operation and 2 planes in full commission in reserve; 2,400 horsepower, engined with 3 motors, capable of a continuous flight of 1,500 miles; speed, 125 knots; crew of 9; capacity, 3 tons; to be mounted with 8 machine guns, in twin mount.
3 squadrons of fighting planes; each squadron to consist of 8 planes in active commission, 4 in full commission in reserve, and 4 in storage.
7 squadrons of pursuit planes; each squadron to consist of 8 planes in active commission, 4 in full commission in reserve, and 4 in storage.

14 squadrons (total).

It is further reported that the following aircraft are to be added to the present air forces during the period 1931 to 1938: 160 airplanes, 20 flying boats, 8 deck planes.

If and when the above planes are added to the existing air forces, which now consist of 120 first-line planes, organized into 17 squadrons and 71 deck planes, there will be a total of 379 planes in the first line of the navy air forces in 1938.

TYPE 89, THREE-PURPOSE PLANE FOR JAPANESE NAVY

The press reports that the Mitsubishi Aircraft Co. recently completed for the navy a deck plane known as type 89. The plane is a double-seater metal biplane powered with a Hispano Suiza 650-horsepower engine, with a speed of 130 miles per hour. It is three purpose (torpedo, heavy bombing, and reconnaissance) plane and is expected to replace the type 13 plane now in use by the navy.

NEW NAVAL AIR STATION AT TATEYAMA

The Japanese have established a new air station at Tateyama, on western shore of Boso Peninsula near its southern extremity, 24 miles from Yokosuka and 40 miles from Tokyo. It is designed as an operating base for shore based squadrons of land planes and seaplanes.

The station was placed in commission in July, 1930. In its construction advantage was taken of a local rise of 8 feet in the sea bottom which occurred during the earthquake of 1923 to fill in the land included between the mainland and a line connecting the outlying islet of Takashima and the low rock of Naga Ne, and grading the former shore line back in order to provide sites for the buildings. A flying field is thus provided 1,200 yards in extreme length by 600 yards in breadth. All buildings are new and seem well

constructed. The administration building and hospital are earthquake proof, reinforced concrete construction with a cream-colored stucco effect, and as they stand on ground about 15 feet higher than the buildings in front, makes them easily recognizable from seaward. The hangars, repair shops, and dope shops are of steel and corrugated iron; other buildings of wood. All buildings have iron roofs.

This station, the newest and one of the best in Japan, is admirably situated both for the defense of Tokyo and as an operating air base for the fleet. Tateyama now corresponds very closely to our Lynnhaven Roads and served as anchorage for the combined fleet during the gunnery exercises in August and September.

FRANCE

ORGANIZATION OF FRENCH NAVAL AVIATION

Following are some translated extracts from an article under the above caption, which won first prize this year in the Academie de Marine and published in La Revue Maritime. The author asserts that the establishment of the Air Ministry profoundly modified the organization of national defense, and asks whether this modification is to its advantage or disadvantage, particularly regarding naval aviation. The spirited controversy resulting from the establishment of the French Air Ministry proceeds not from the constitution of a coordinating organism but from the question of the utility of a department commanding the total aerial forces. In France, as in England, there is active resistance by the Navy Department to the idea of an integral "air force":

> Naval aviation is generally divided into coastal aviation and shipboard aviation, but this classification really corresponds to the difference in the points of departure rather than to any difference in the purposes for which they are used. For the present, coastal aviation is concerned with coast defense, but it is predicted that the development of aircraft will before long result in groups of long radius of action, able to participate in offensive operations on the high seas, a real autonomous fleet.
>
> The problem of coast defense naturally involves a collaboration between the terrestrial coastal elements and the naval coastal elements. Those of the Navy constitute, in a way, the advanced guard, the first line of defense, while those elements of the land constitute the second line. As a consequence of the importance, in modern war, of the mine and the submarine, the first line of defense tends to advance further and further from the coast.
>
> One finds the same characteristics corresponding to these two lines of defense in coastal aviation, which may be separated into two groups. The first part will comprise the aircraft which guard the littoral and the channels leading to the ports; also the aircraft squadrons destined

to attack surface ships in coastal waters. The second part will comprise squadrons of fighting planes charged with the defense of the ports and coastal bases against aerial attack. The first group, composed of seaplanes or amphibians, has a rôle essentially naval. In the first place, its business is to patrol the sea in a manner similar to that of light vessels and coastal launches. All the elements of this group are of the naval character, armed to attack naval targets at sea. Their action tends to extend further from the coast the first line of defense, consequently rendering the littoral less directly vulnerable to the blows of the attacking naval force. The rôle of the combat squadrons is closely linked with the other elements of aerial defense on shore, that is, antiaircraft artillery, listening devices, etc. These squadrons would also be charged with the defense of any portion of the fleet at anchor in the harbor.

Whether aircraft be carried on the vessels of the fleet or on a special carrier, they are evidently destined for naval operations. The protection of aircraft carriers against enemy ships or submarines requires surface vessels armed with guns or torpedoes which are in turn protected by the aircraft of the carriers. It is not too much to predict that the carrier will gradually transfer its light planes to the other vessels of the fleet, and that its heavy aircraft will tend to become autonomous. Embarked aviation will thus become more and more an integral part of the armament of all surface vessels.

At the present time what may be called aviation of the high seas is composed of rigid airships and a few heavy seaplanes, but we believe there is a great development coming. There seems to be no limit which may be attained in the size of these craft, and the sea will furnish them ample landing space. Their sea-keeping qualities will improve with the increase in size, which permits us to imagine the aerial cruiser of the future—seaplanes or flying boats provided with exact means of navigation and radio, armed with torpedoes, bombs and automatic cannons, cruising in squadrons which may anchor in sheltered bays, or even refueling at sea. The logical arm of these fast vessels will be the torpedo, and we believe that the present doctrine of employment of the torpedo against ships in the battle line will apply better to a flotilla of these craft than to a flotilla on the surface.

This autonomous seagoing aviation, as nearly as we can foresee, will divide into aircraft cruisers and aircraft destroyers. The defense of the fleet against these craft will rest with the fighting planes carried on board the surface ships themselves, and these will necessarily be very numerous. As these fighting craft must be carried on surface ships, it follows that the command of the air, at sea, is directly linked, and even subordinate, to the command of the sea.

Naval aviation is logically composed of the following parts: First, the seagoing elements of the aeronautical coast defenses (patrol of the sea front and attack of enemy ships near the coast). Second, embarked aviation, which must be assimilated as a particular arm of the surface ships and which constitutes the essential element for fighting enemy planes at sea. Third, autonomous squadrons, destined to take part on the high seas in specifically naval operations, and which must be considered as flying naval forces.

On the other hand, it is logical to assign to the aerial defense army, all the fighting squadrons which defend the coasts against aerial at-

tack, and also such bombing squadrons as are called upon to attack enemy ports from bases on our coasts, which may be the case in the narrow seas of Europe.

Naval aviation, thus limited and defined, is strictly dependent for its action, upon the other naval forces, the principal object being the defense of maritime communications. It follows that the purpose of naval aviation, whether embarked or autonomous, is identical with the object of the surface squadrons and the submarine squadrons.

The defense of maritime routes is the veritable object of naval aviation. It is useful to recall this fundamental truth, because some persons go so far as as to pretend that future air lines can supplement the maritime routes and that the large aircraft will be able to contribute to the provisioning of a country whose maritime routes have been cut. This hypothesis would justify the creation of an an independent air fleet over the sea and the land, for the defense of aerial routes.

It is easy to see that this hypothesis dreams of Utopia. The commercial aircraft can not replace the cargo ship because the relative return for the power expended is incomparably less, and this confines aerial transport to the carriage of precious freight and rules out the carriage of such essentials as wheat and oil and other raw materials by which modern people and their industries live. The free use of maritime routes, that is, the command of the sea, therefore goes back to the command of the surface of the sea. In these days, command of the sea consists of command of the surface, of the water under the surface, and of the air above it.

Each country has its air problem, which depends primarily upon geographic, strategic, and even political situations. The United States does not need to fear attacks from the air, as their possible enemies live beyond wide oceans. They have, therefore, no use for an independent air force, but their naval aviation is exceptionally important.

England being an island, the army is but slightly concerned in territorial defense, but there exists the peril from the air; and the Royal Air Force tends to supplant the army for territorial defense. The creation of the Royal Air Force has, however, considerably retarded the development of naval aviation, which is certainly much behind that of America.

In Italy the situation is practically the same, for the wall formed by the Alps, protecting the country against a terrestrial enemy almost as well as a channel of the sea, makes Italy practically an island from the strategic viewpoint.

In France the situation is quite different and the aerial problem is more complex. We are obliged, by reason of our frontiers on the north and east, to provide our army with considerable auxiliary aviation, and the defense of our territory against a terrestrial enemy and an aerial enemy are very closely related. It must be remembered that our aviation for territorial defense is distinctly of a terrestrial character, because the aerial peril for our nation naturally proceeds from land bases.

The partisans of the Air Ministry invoke the lessons of the last war without thinking that naval aviation did not then exist. They also base their arguments on the unity of the technique of aviation and the superior reason of perfecting the material. But if the object

of naval aviation is essentially naval and identical with that of the navy, it must be commanded by the navy, and it is useless to emphasize the grave consequences which would result from divided command.

The organization of the navy is entirely different from that of the army. In the army the different branches, artillery, infantry, cavalry, etc., are organized separately into battalions regiments, and divisions, which must naturally cooperate in combat. Aviation is likewise constituted into regiments, brigades, or other important independent formations.

In the navy the situation is different. The unity of command is the ship on board which the different specialties are intimately mixed to form the crew. An aircraft may be considered as a unit of combat possessing its crew also. The objects of naval aviation being essentially naval, its personnel must not only be aviators, but possess solid maritime intruction in order to be able to navigate over the sea, to identify the type of enemy warships encountered, to recognize their tactical formation, to interpret the object of an observed maneuver, to attack with the torpedo or to lay a smoke screen. For the naval aviator and the officer on the bridge of a surface ship, the reflexes must be identical. Numerous examples from the World War show how costly was this lack of a naval education.

The creation of a corps of naval aviators appears to be the only possible means of adapting the air force to naval aviation. From the moment when independent flying boats are furnished the navy, it will be necessary to separate their personnel from the aerial forces concerned with land operations, in order to link them with embarked aviation. Thus the independent air force will inevitably be split into two parts, territorial and maritime, the latter not only for the purpose of safeguarding their naval character, but also to assist in the progressive development of naval flying material.

But if the necessity of a corps of naval aviators grows out of the establishment of the air ministry, this corps will be submitted to the misfortunes of divided command. It will inevitably tend to separate from the Air Ministry and move toward the navy. Thus it may result that Naval aviation, being interposed between two authorities, will escape from both. These naval aviators, originally from the army of the air, will never be assimilated into the naval organization on account of their different formation, different spirit, and insufficient maritime instruction.

In the seventeenth century, in order to fill the vacancies in ships' crews, at a time when artillery employment was increasing at sea, there was a considerable transfer of riflemen and artillerymen from the army to the fleet. The result was so bad that it was soon necessary to form a corps of naval artillery, which has been gradually assimilated by the navy.

To sum up, a single air force will be impossible without the constitution of a corps of naval aviators. At the same time such a solution presents grave difficulties. The best solution that can be made of it is to train a sufficient number of naval officers to fly, and that is what has been done in England and in Italy. This solution has also the advantage of economy. On board the British aircraft carriers, the number of officers required has by this means been reduced in the proportion of 18 to 11. Nevertheless, if these officers are taken into the air force, there will remain the evil of divided command.

It is evident that naval aeronautical matériel is becoming more and more different from aircraft employed on shore. Even the light craft carried on shipboard must be specially constructed, and for the heavy flying boats the difference is even more plainly marked. Furthermore, it is logical that the navy should determine the qualities of its aircraft employed in naval missions. It is inadmissable that an essential arm of the navy be built, outfitted, and manned by another department of the government. Plain common sense indicates that the only effective training of the personnel and the design of matérial for its special use can be attained only by the authority responsible for the execution of the mission.

Divided command is an even greater vice when it is introduced into an organization like the navy, whose principle is unity of command. In the army, mutual cooperation exists between the various arms, and an independent air force, added to the other arms, would not seriously complicate the existing problems of cooperation. Naval organization is based on the ship as a unit and the system of separation and cooperation is not applicable.

ITALY

ITALIAN GOVERNMENT ORDERS TWO D. O. X. SEAPLANES

It is reported that Italy has arranged for the purchase of two "D. O. X." type seaplanes from the Dornier plant on Lake Constance, Switzerland. It is said that the first of these two "D. O. X."-type seaplanes will be finished about the 1st of January, 1931, and that this plane will be equipped with 12 motors of the Fiat "A.22" type, with reduction gear of 560 horsepower each.

SUBMARINE NOTES

BRITISH EMPIRE

NEW BRITISH SUBMARINES FOR CHINA STATION

The new British submarines *Perseus*, *Pandora*, *Poseidon*, and *Proteus* sailed early in December on an unescorted voyage for the China station, to replace vessels of the L class withdrawn some time ago. A Gibraltar dispatch of December 17 states that *Proteus* and *Pandora* were in collision the previous night about 80 miles west of the Straits, but appear to have been only slightly damaged. The four boats arrived at Gibraltar on December 17.

JAPAN

SUBMARINE "I–51" EQUIPPED WITH SEAPLANE

The press reports that the submarine *I–51* (1,400 tons), is equipped with a small seaplane having folding wings and powered with a 80-horsepower engine, capable of making a continuous flight of 8 hours. The wings of this seaplane can be assembled five minutes after coming to the surface of the water and can be disassembled in five minutes. Training exercises in flying are now being conducted in Hiroshima Bay. It is also reported that the navy is planning to equip this seaplane with dropping gear for depth charges.

FRANCE

NOTES ON FRENCH SUBMARINE TORPEDO TUBES

In addition to fixed torpedo tubes on submarines the present practice of the French Navy is to install tubes which permit of train—" tubes orientables "—through a considerable arc. It is understood that they are capable of operation only on the surface or while in the awash condition. They are operated by electrical motors. A description of the tube installations on board some of the more recent types of French submarines follows:

Orion class.—For the smaller class of coastal submarines, there is a very ingenious arrangement of three bow tubes: One tube

(internal) is approximately on the center line but inclined slightly (5°) to the starboard bow, while two fixed tubes are situated under the superstructure forward at an angle of 40° on the port and starboard bows, respectively.

In addition to the above three bow tubes, the *Orion* class have three "orientables" aft, of which one accommodates a 21.7-inch torpedo, while the remaining two are smaller, probably for 16 or 18 inch torpedoes.

There are also installed two additional "orientables" in a single mount amidships, for 21.7-inch torpedo.

Pascal class.—In the 1,379-ton (standard) submarines of the *Paschal* class there are four fixed tubes in the bow (21.7-inch); four "orientables" aft in a single mount, the two outboard tubes being 21.7-inch and the two inboard tubes of 16 or 18 inch.

Installed in the superstructure, amidships, are three additional tubes, "orientables," in a single mount, definite information as to size unknown at present, but probably one for 21.7 inch and two for 16 or 18 inch torpedoes.

SOLID-FUEL INJECTION FOR SUBMARINE ENGINES

It is understood that at present the French do not consider solid fuel injection thoroughly reliable in large Diesel units (around 5,000 horse power), but that they consider it satisfactory for smaller units up to 1,500 horsepower, and have the solid injection in service in the 630-ton coastal submarines equipped with Vickers-Norman engines.

It is stated that the solid injection has been found more economical (approximately 10 per cent), and has given no particular difficulty with smoking, except when forced unduly.

It is also reported that solid-fuel injection was incorporated in the 1,000 brake horse power Vickers Diesel engines installed in the three Polish mine-laying submarines (*Rys*, *Zbik*, and *Wilk*, 980–1,250 tons) recently built in France.

NOTES ON FRENCH SUBMARINE VENTILATION

In the the *Paschal* class of submarines the ventilation is provided by two electrically driven blowers for circulating fresh air, and two for exhausting the vitiated air from compartments. It is understood that caustic soda or soda lime is provided in sufficient quantity for a period of 12 hours before CO_2 develops in dangerous concentration and for a period of 20 hours before the oxygen is more or less completely absorbed. So far as known, no special means or apparatus is provided for dehumidifying air in French submarines.

ITALY

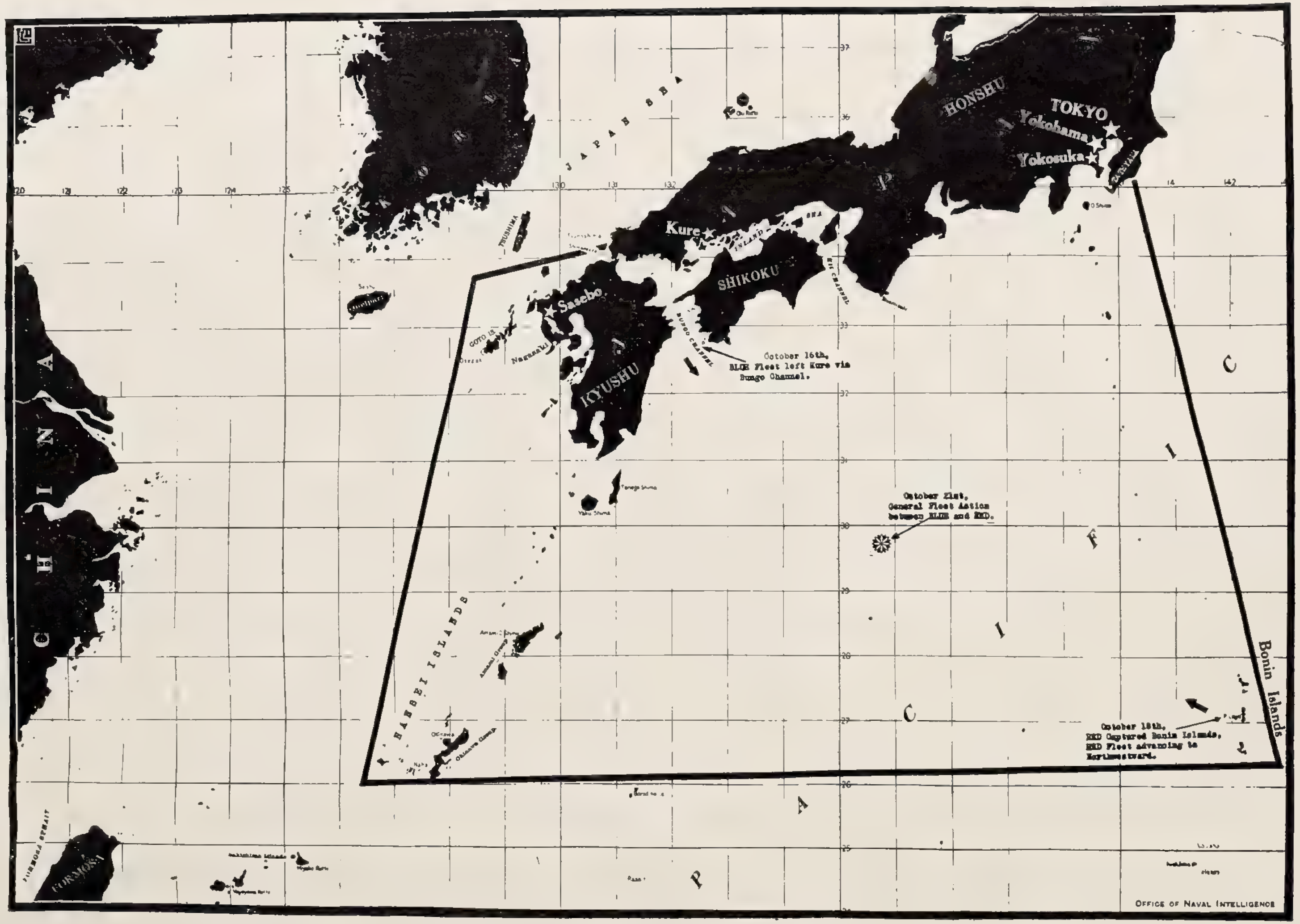
ACCEPTANCE TRIALS OF ITALIAN SUBMARINE "LUIGI SETTEMBRINI"

It is reported that during the acceptance trials of the Italian submarine *Luigi Settembrini*, 930–1,150 tons, completed on December 3, 1930, that vessel attained a speed of 17.67 miles per hour, thereby surpassing the contract speed of 17.5 miles per hour. She is equipped with two Tosi engines of 1,500 horsepower each, and two electric motors of 650 horsepower each. The armament consists of eight torpedo tubes, 12 torpedoes, one 4-inch, 35-caliber gun with a large supply of ammunition and of several machine guns. Radius of action, 9,000 miles; submerged radius, 80 miles.

The press further states that the submarines ordered for the Argentine Navy are of the same type as the *Settembrini.*

POLAND

The Polish submarine *Rys*, ordered in 1927 and built at the Chantiers de la Loire, at Nantes, France, has arrived at Nantes to complete her equipment. The installation of torpedo tubes and mine-laying equipment is to be installed under inspection by the Polish Trial Commission. The *Rys* is of the same type as the *Wilk*, built at the Normand Shipyards, and the *Zbyk*, built at the Chantiers Navals Francais.



JAPANESE GRAND MANEUVERS, 1930

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The Japanese grand maneuvers were held October 10 and 26, 1930, inclusive. The maneuvers were divided into two periods; from October 10 to 15 and October 17 to 26, terminating with the grand review on October 26. The Blue force (defending) comprised the combined First and Second active Fleets and the Red force (attacking) comprised the Third Fleet, which was especially organized for the maneuvers from ships attached to naval stations and part of the active air force. The theater of war was roughly the quadalateral formed by lines connecting Yokosuka, Bonin Island, Nansei Islands, and Sasebo.

The conduct of the maneuvers was planned to cover particularly the following points:

(1) The effectiveness of the navy, as limited under the London treaty, in a war with a power having a navy of superior strength.

(2) Major operations of the fleet in scouting, screening, and day and night actions with aircraft and submarines.

(3) Mobilization of shore establishments in conjunction with the fleet mobilization.

(4) Test of the defenses of Sasebo, Kure, and Yokosuka, especially against airplane and gas attack.

(5) Operation of advanced bases at Amami-oshima and the Bonin Islands.

(6) The establishment of temporary air bases at Ishigaki, Saiki, Bako, and Amami-oshima.

(7) The usefulness of the new aviation station at Tateyama.

(8) Effectiveness of airplanes and submarines in supplementing deficiencies caused by the London treaty.

(9) Mining and mine sweeping.

(10) Operation of the new 10,000-ton cruisers of the *Nachi* class.

(11) Communications not only between ships but between airplanes and ships, and between forts and ships, but also for practice at interference and at radio silence throughout the war zone.

(12) Call of reserve officers and men to active duty. (Total of 30 officers and 250 petty officers and men.)

The general problem was the locating and checking of a superior hostile fleet advancing from the South Sea Islands.

FIRST PERIOD

This year the joint army and navy maneuvers were not, as formerly, held during the first period of the grand maneuvers, but instead were carried out a month beforehand, in September. The September operations covered considerable areas of the mainland

and included protection of civilian population from air raids, receiving of wounded in hospitals, darkening of areas attacked, and the utilization and training of the Young Men's Association and other civilian organizations during war conditions.

During the grand maneuvers these exercises were repeated, but were more limited in their scope and confined to strategic points in fortified zones at Yokosuka, Tateyama, Kure, Sasebo, and other naval air bases. Great attention was paid to protection from air attacks, particularly from night air attacks, and the control of lights was stressed throughout. Some special notes on the operations carried on from the above-mentioned bases are indicated in the following tabulation:

FIRST PERIOD (OCTOBER 10–15, INCLUSIVE)

(Maneuvers began October 10. All navy yards and stations were place on mobilization status. Blue Fleet at Kure; Red Fleet at Ise Bay. Temporary air bases established at Ishigaki, Bako, Saiki and Amami-oshima)

Date	Yokosuka area	Kure area	Sasebo area	Bako area
Oct. 10	14th Destroyer Division at base	Antiaircraft batteries established at Takatori Battery, Aga, submarine school, Shiroyama, and Keigoya. Oil tanks and coal depot camouflaged. City placed under martial law. Bungo Channel closed by antisubmarine nets and mines. Kure defense corps established base at Saiki Bay and cooperates with 1st Air Squadron to prevent passage of enemy submarines.	Martial law declared in Sasebo area. Sasebo and Omura Aviation Corps in cooperation with Hiro Aviation Corps established advance bases at Saeki and Amami-oshima and with support of aviation corps at Kasumigaura, Tateyama, and Yokosuka prepared to defend the coasts of Shikoku, Kyushu, and Loochoo Islands against Red Fleet. At Amami-oshima, three No. 1 type flying boats and six type 14 reconnaissance seaplanes from Sasebo.	(NOTE.—Bako, Japanese naval station, located in Pescadores, in Formosa Strait, is fortified, but main protection by submarine mines. Depot for mines, ammunition, and stores; equipped for repairing torpedo boats, etc.)
Oct. 11	DAY AIR ATTACK ON YOKOSUKA *Attacking force:* 2 planes from Kasumigaura. *Defending force:* 36 planes from Yokosuka Air Station, batteries of ships, and shore batteries. *Operations:* Started 1,300. Attacking planes were finally driven off, but were successful in bombing aviation corps, defense corps, and navy barracks. NIGHT AIR ATTACK ON YOKOSUKA *Attacking force:* 8 planes from Kasumigaura. *Defending force:* 36 planes from Yokosuka Air Station, batteries of ships, and shore batteries. *Operations:* Attack at 2000. Naval station and town of Yokosuka were darkened. Searchlight used. Warning given by siren sounded at listening post established at Arasaki, near end of Miura Peninsula. Navy yard and naval station bombed with illuminating bombs. Attack repelled by antiaircraft batteries at Sarushima and Yokosuka Naval Barracks. Attack repeated at 2155 and again repelled. Operations ended at 2215.	6th Mine-Sweeping Division, plus net layers Tsubame and Kamome left for Saiki Bay for operations in the Bungo Channel. Takatori Battery reinforced by 150 men for aerial defense. Karasaki (serving as seaplane tender) stationed at Saiki Bay.	Seven destroyers from the 15th and 27th Destroyer Divisions of 1st Destroyer Squadron left Kure for the defense of Sasebo.	Joint maneuvers held over Heito between the Bako Special Aviation Corps and the Army Air Regiment. Regulation of lights throughout island of Hoko. Night attack by 26th Destroyer Division against Bako Naval Station.

FIRST PERIOD (OCTOBER 10-15, INCLUSIVE)—Continued

Date	Yokosuka area	Kure area	Sasebo area	Bako area
	NIGHT AIR ATTACK ON YOKOSUKA—con.			
Oct. 12		Landing force attempts to capture Kure. *Attacking force:* Landing forces from the Fuso, Hiyei, Yahagi, Asama and Yugao; total of 500 men. *Defending force:* Kure Defense Corps, 500 men. Problem ended at 2300; results not known. October 12: Plane No. 1 of the Myoko developed motor trouble and made forced landing on sea near Himejima. Neither plane nor pilot were injured.	Day and night air attacks on Sasebo. *Attacking force:* Fighting planes from Omura Aviation Corps and seaplanes from Sasebo Naval Station. *Defending force:* Fighting planes from Omura Aviation Corps and seaplanes from Sasebo Naval Station. Antiaircraft batteries at naval station; antiaircraft batteries of ships in harbor. 0925: Warning given by radio station and sirens. Enemy planes appeared in direction of Goto and were opposed by an equal number of planes from Sasebo. Antiaircraft fire was directed at enemy planes from batteries and ships at anchor in harbor. Problem ended at 1000. 1800: Attack was renewed with similar forces. Sasebo area was darkened; searchlights used.	Oct. 12–14: Defense of naval station against day and night attacks by detached light forces. *Attacking force:* Isuzu and 3 submarines of 5th Submarine Squadron. *Defending force:* 26th Destroyer Division, Bako Defense Corps. Attack by submarines on ships in Bako Harbor.
Oct. 13–14	Oct. 13–14: An attempt to capture Yokosuka by landing force. *Attacking force:* 7th Destroyer Division, steamship Iyomaru (transport), two seaplanes, landing force of 4 companies. *Defending force:* 14th Destroyer Division; 4 combat deck planes, landing force of 1 company. The attacking force drove in the defending force which engaged south of the Miura Peninsula and on the following day attempted a landing at Kaneda, Miura Peninsula. The invading forces were annihilated by defending forces sent from the naval station.	Local maneuvers involving defense of Sasebo Naval Station. *Attacking force:* Landing force from ships in harbor comprising one company of infantry and one machine gun company, designated as Group A. Day air attack on Kure. *Attacking force:* 10 planes from Blue Fleet aircraft carriers. *Defending force:* Kure Defense Corps, antiaircraft batteries, vessels of the combined fleet in harbor, aircraft of the combined fleet, aircraft at Hiro. 0700: 1st Air Squadron, 1st Destroyer Division, 1st Submarine Squadron left for Saeki. 0900: 10 bombing planes appeared off Shinminato. Warning sent out by aircraft of the combined fleet and Hiro Naval Station. Twelve aircraft sent against attacking force, which broke	*Defending force:* One infantry company and one machine gun company from Sasebo Defense Corps, designated as Group B. 0800: Groups A and B leave Sasebo for Haiki. From Haiki Group A advanced toward Arita and Group B toward Kawatara, holding separate maneuvers along railroad lines. Separate night maneuvers followed.	See above.

		through. A smoke screen was laid by vessels in harbor and antiaircraft fire was used. The attacking planes succeeded in bombing the navy yard and the naval store depo t from an altitude of 3,000 yards.		
Oct. 14	See above.	Night air attack on Kure and Hiro. *Attacking force:* 12 bombing planes from aircraft carriers of Blue Fleet. *Defending force:* Antiaircraft batteries; antiaircraft fire from vessels in harbor; Kure defense force. 0800: Detachments from Kure sent to near-by towns of Kegoya and Yoshima in anticipation of attempted landings. 2400: Attacking planes appeared over Hiroshima Bay and lights were entirely darkened by signal of two guns. Searchlights picked up four planes at high altitude over Kure, which came lower and bombed the railroad tunnel at Shingu, when all antiair fire was directed against them. Meanwhile one-half the attacking force of planes, having bombed the oil tanks near Hiro, rejoined the other group over Kure. The umpires decided that the Asahi at anchor and the gun manufacturing section of the Kure Navy Yard received serious damage, that the battery at Takaharasu was completely destroyed, that all attacking planes but one were shot down, and that the air defenses of the Kure Naval Station were seriously defective.	Oct. 14: Combined maneuvers of the two groups held during day with Hosami as center, continuing during night. Decisive engagement fought at Hosami at dawn of 15th.	See above.
Oct. 14	See above.	See above.	See above.	Night air attack on Bako Naval Station. *Attacking force:* 10 planes from Heito air regiment. *Defending force:* Bako Special Aviation Corps; Bako Defense Corps; antiaircraft batteries; antiaircraft fire from ships in harbor.

OPERATION NOTES (FIRST PERIOD)

Some general notes on operations conducted by the Blue and Red Fleets during the first period follow:

BLUE (DEFENDING FORCE)

At the opening of the maneuver the First and Second Fleets (Blue) were concentrated at Kure.

Oct. 10: Ships exercised at launching seaplanes and in coordinating air defenses of Kure. Dirigible No. 5, "type 1," attached to the Blue Fleet, with Tateyama as base.

Oct. 11: 6th Mine-Sweeping Division, 1st Mine-Sweeping Division, plus net layers *Tsubame* and *Kamome* left for Saeki Bay for practice in sweeping mines and laying nets in Bungo Channel.

Oct. 12: The *Fuso, Hiyei, Yahagi, Asama* and *Yugao* sent landing forces ashore for maneuvers with Kure Defense Corps.

Oct. 13: 1st Air Squadron, 1st Destroyer Division, and 1st Submarine Squadron left for Saeki, which had been established as an advanced base.

Oct. 15: *Kirishima*, left for Yokosuka and prepared to receive Emperor.

Oct. 15: Blue Fleet left for Pacific through Bungo Channel for a point eastward of Amami-oshima.

RED (ATTACKING FORCE)

At the opening of the maneuvers the Red Fleet was concentrated at Ise-wan and engaged in gunnery exercises and division evolutions until the 14th.

Oct. 10: *Akagi* sent 8 combat planes and 13 reconnaissance planes to Akenogahara for practice in holding communication with the fleet and in practicing aerial attacks. Army officers detailed to submarines as observers in making reconnaissance of coasts.

Oct. 15: Red Fleet left Ise-wan in following order to take up position to south for maneuvers of second period:

Third Submarine Squadron with *Tsurumi* and *Erimo* (oilers).

Third Destroyer Squadron and 7th Cruiser Division.

Main body of Red Fleet with remaining cruisers, destroyers, and submarines.

Forces operating at Bako: During the first and second periods, the 26th Destroyer Division operated at Bako.

SECOND PERIOD

The time allotted to the second period of the maneuvers was so limited as to necessitate the initial position of the enemy fleet and the general direction of its advance to be known beforehand. Forces were not widely dispersed as would be the case in operations covering wide areas and the Blue scouting presented no particular difficulties. The problem was thus, by the time of beginning the second period, already advanced almost to first contact.

The maneuvers of the second period (Oct. 15–21) is believed to have been based, as in maneuvers of 1927, on two assumptions, as follows:

First assumption.—War exists between the United States (Red) and Japan (Blue). The United States Asiatic Fleet has retired to Manila Bay (Ise Wan) and is blockaded by Blue. Blue land forces have invested Manila, but it is still held by Red.

The Red fleet (United States) with troop convoy and train is en route from the United States and proceeding to the relief of Manila (Ise Wan).

Second assumption.—War exists between the United States (Red) and Japan (Blue). The United States Asiatic Fleet retired to Manila, where it was destroyed or captured. A Blue expeditionary force has occupied Manila.

The Red fleet has approached the vicinity of the Bonin Islands and the fall of Ogasawara Island as a base is imminent. The Red fleet will attempt to bring Blue to a decisive fleet action before undertaking the recapture of Manila.

BLUE ESTIMATE OF SITUATION (FIRST ASSUMPTION)

Mission.—To prevent relief of Manila by Red fleet.

Contributing missions.—(1) To maintain blockade of Manila.

(2) To ascertain strength and disposition of enemy main fleet.

(3) To destroy enemy convoy and reduce capital-ship superiority by submarines, destroyer and air attacks.

Enemy forces (Red).

Strength.—See Red organization, accompanying table.

Disposition.—Red Asiatic Fleet in Manila Bay. Red main body plus convoy has left base A (Honolulu) and is proceeding to relief of Manila.

Probable intentions.—Red, although superior in capital ships, destroyer, and air forces, will assume tactical defensive until Blue main force is brought into action.

Own forces (Blue).

Strength.—See Blue organization accompanying table.

Disposition.—Blockading force off Manila. Blue main fleet at X (probably Bonin Islands).

Courses of action open.—(1) To undertake destroyer, submarine, and air raids on Red main body and convoy, avoiding a main fleet action.

(2) To bring Red Fleet to a decisive action after his superiority has been reduced by raids.

Decision.—Red must be brought to action, else he will bring about the relief of Manila, thus causing the failure of our mission. An early decisive engagement will be to Red's advantage, as he is in superior strength. On the other hand, hampered as he is with transports and train, his strength will be weakened by attrition the further he advances. Therefore Blue forces will:

(1) Make every effort to capture Manila and destroyer Red Asiatic fleet prior to arrival of Red main body.

(2) Scouting force ascertain movement of enemy main body and convoy.

(3) Main body at base B.

(4) Submarine force proceed to latitude —— longitude ——.

(5) Air forces proceed to latitude ——, longitude ——.

(6) After location of enemy fleet, deliver day and night submarine, destroyer, and air attacks on main body and convoy.

(7) Bring enemy main fleet to action after reducing superiority in capital ships.

BLUE ESTIMATE OF SITUATION (SECOND ASSUMPTION)

BLUE (JAPANESE) ESTIMATE OF THE SITUATION, SECOND ASSUMPTION

Mission.—To bring Red main fleet to a decisive engagement under conditions favorable to Blue after reducing Red superiority in capital ships by day and night attacks by light forces.

Contributing missions.—(1) To ascertain enemy strength and disposition preparatory to attack by main fleet.

(2) To reduce enemy superiority by destroyer, submarine, and air attacks.

Enemy forces (Red).

Strength.—See Red organization accompanying table.

Disposition.—Red fleet has seized a base C in the South Seas and is proceeding northward. Red Asiatic Fleet has been destroyed or captured at Manila which has been occupied by Blue forces.

Probable intentions.—Red main fleet will attempt to bring Blue main fleet to a decisive engagement as soon as possible.

Own forces (Blue).

Strength.—See Blue organization accompanying table.

Disposition.—Manila is held by our expeditionary force. Blue main body at advanced base X (Saeki Bay).

Courses of action open to us.—(1) Undertakes offensive operatins against Red main fleet with a view to engaging him decisively as soon as possible.

(2) Operate on interior lines and fall back toward main islands of Japan delaying decisive engagement unt l Red superiority has been overcome by day and night air, destroyer and submarine attacks. This course would be particularly advantageous for attacks by submarines and shore based airplanes in case Red continues his advance northwards.

Decision.—Course (2) is distinctly advantageous in that it utilizes the geographical advantages of interior lines, utilizes the air forces to the fullest extent, and is most favorable for submarine attacks. Therefore:

(1) Scouting force and air forces ascertain movement of enemy main body from base C.

(2) Main body proceed to latitude ——, longitude —— (south of Shikoku).

(3) Submarine forces proceed to latitude ——, longitude ——.

(4) Air forces proceed to latitude ——, longitude ——.

(5) After location of enemy main body deliver day and night destroyer, submarine, and air attacks.

(6) Bring enemy main fleet to action after reducing superiority in capital ships.

OPERATION NOTES (SECOND PERIOD)

Some general notes on operations conducted during the second period (Oct. 15-21) follow:

Red fleet left Ise-wan October 15 and proceeded to its initial position to westward of Ogasawara Islands.

The Blue fleet left Kure October 16 and the advance force stood out to sea through the Bungo Channel, the main force remaining at Saski. Blue probably established a scouting line to eastward of Amami-oshima bearing 30° from Bungo Channel, distance about 450 miles. The northern end of this line would thus be covered by planes from Sasebo, Omura, Saeki, and Oita; the southern end by planes from Amami-oshima and Ishigaki.

October 18, zero hour 0600: Maneuvers started by order of Emperor of Kirishima. Both forces started scouting and screening operations with cruisers, destroyers, submarines, and aircraft.

October 18: Ogasawara Island (Bonins) captured by Red.

October 18—0600: Sixty planes attached to Yokosuka, Tateyama, Kasumigaura and Hachijojima formed a scouting circle 250 miles in radius with Yokosuka Naval Station as center. Ten vessels, including destroyers and the converted cruiser *Iyomaru*, placed on scouting line. First contact made at 1500 when Blue destroyer sighted *Akagi* and three of the (theoretical) 10,000-ton cruisers in her guard. Red submarine adjudged sunk by *Iyomaru*.

October 18: *Kirishima* anchored off Yokosuka and Emperor observed control of lights of station, *Kirishima* then proceeded to sea.

October 18–19 (night): Second Destroyer Squadron (Blue) made contact with Third Destroyer Squadron (Red) and penetrated the Red screen. Deck planes from the *Akagi* (Red) came into action and both sides carried out repeated torpedo and air attacks. Blue was unable to drive home any attacks on the *Akagi* owing to the screen of 10,000-ton cruisers, and finally lost contact with the Red Air Squadron. The Fifth Cruiser Division and First Submarine Squadron (Blue) made contact with the Red Fourth Destroyer and Third Submarine Squadron. The navy dirigible set out from Tateyama to search for the *Akagi* but without success.

October 19, 0400: Twenty-seven deck planes took off from *Akagi*, then about 200 miles south of Yokosuka, and raided Yokosuka Naval Station and Tateyama. The approaching planes were detected first by the listening post established at Kujukuri Beach at 0530. Planes from Yokosuka and Tateyama Aviation Corps met the enemy planes, and an air combat followed, which terminated at 0600, when the Red planes retreated, followed by Blue. The pursuing Blue planes located the *Akagi* and guard at 0830 and carried out a bombing attack. Umpires decided that during the attack on Yokosuka and Tateyama, nine Red planes and three Blue planes were shot down, that Yokosuka was completely destroyed, and that the offensive power of the *Akagi* was reduced 50 per cent by the bombing attack. Fairly heavy weather during this and the two following days.

October 19, night: Blue main force moved out to Tosa Sea in anticipation of a fleet action, the direction of northward movement of Red having been determined.

October 20, 0600: Air combat between *Kaga*, *Hosho*, and *Akagi*. A plane from the *Kaga* fell into the sea south of Enshu Nada and the pilot was lost. The observer was picked up by the *Nokaze*.

October 20, night: Repeated destroyer and submarine attacks were made by Blue and Red. The position of Red at 1800, the 20th, seems to have been about 250 miles north by west of Ogasawara Gunto and the course northwesterly.

October 21, 0600. Aircraft from Ogasawara, Hacjijojima, Amamishima, Saeki, and Kusimoto were dispatched to perform tactical scouting and to make an air attack on the approaching Red Fleet. A general fleet action followed.

October 21, 1045: Maneuvers ended by order of the Emperor on the *Kirishima*. At this time the position of the fleets was about 225 miles south of Shiomisaki, in Wakayama Prefecture. All ships then proceeded to Kobe for the grand naval review on the 26th.

October 21, 1530: The light cruiser *Abukuma*, of the Seventh Cruiser Division, Red Fleet, while en route to Kobe collided with the *Kitagami* and was so badly damaged as to require being towed by the *Hyuga* to Yokosuka. The *Kitagami* escaped serious injury.

UMPIRES' DECISION

The decision of the umpires was that the Blue Fleet was completely defeated. Their conclusions were reported to be as follows:

(1) Air forces have a great effect on the outcome of a fleet action. Therefore the fleet with a superior air force will win.

(2) Submarines are an effective defense for an inferior fleet. Hence, inferior submarine strength may bring about defeat.

(3) The 10,000-ton cruisers showed great fighting value. Blue attempts to reduce Red superiority by repeated destroyer attacks failed because of the Red 10,000-ton cruisers and his superior air force.

A comparison of this year's maneuvers with past maneuvers shows no change in Japan's fundamental naval strategy, that is—

(*a*) To engage in main fleet action only under the most favorable conditions, namely, after the invading fleet has suffered the maximum damage from attrition and in proximity to Japan proper, where the fleet may be effectively assisted by submarines working on interior lines and the inferiority in aircraft may be supplemented by shore based aircraft.

(*b*) To keep open the line of communications with the Asiatic Continent.

(*c*) To keep open the oil supply routes. Formerly this meant the routes to Borneo only. Now, the rapid development of the North Saghalien fields and the constant increase of oil in storage in Japan proper has made the keeping open of the trade routes to the East Indies from the very outbreak of the war of somewhat less pressing importance than in the past. However, it may be expected that Japan will, in time of war, keep all available tankers running oil both from Borneo and Oha and will divert light forces for their protection.

COMPOSITION OF FORCES

BLUE FLEET

Commander in chief, Vice Admiral Y. Yamamoto; flagship, *Mutsu.*

FIRST FLEET

Flagship, *Mutsu;* commander in chief, Vice Admiral Y. Yamamoto.
First Division: *Mutsu* (flagship, Vice Admiral Yamamoto), *Yamashiro, Ise, Haruna.*
Third Division: *Yura* (flagship, Rear Admiral H. Yuchi), *Nagara, Sendai.*

First Destroyer Squadron

Naka, flagship; Rear Admiral A. Goto.
Thirteenth Division: *Sawarabi, Kuretake, Wakatake, Sanaye.*
Fifteenth Division: *Hagi, Susuki, Fuji, Tsuta.*
Sixteenth Division: *Fuyo, Asagao, Karukaya.*
Twenty-seventh Division: *Hishi, Ashi, Sumire.*

First Submarine Squadron

Jingei, tender; Rear Admiral S. Omoto.
Twenty-fourth Division: *Ro*–63, 64.
Twenty-sixth Division: *Ro*–60, 61, 62.

SECOND FLEET

Flagship, *Ashigara;* Vice Admiral N. Iida.
Fourth Division: *Ashigara* (flagship, Vice Admiral N. Iida), *Haguro, Nachi, Myoko.*
Fifth Division: *Aoba* (flagship, Rear Admiral G. Hyakutake), *Kinukasa, Kako.*

Second Destroyer Squadron

Kinu, flagship; Rear Admiral H. Ichimura.
Eleventh Division: *Miyuki, Fubuki, Shirayuki, Hatsuyuki.*
Twelfth Division: *Murakumo, Usugumo, Shinonome, Shirakumo.*
Nineteenth Division: *Uranami, Isonami, Shikinami, Ayonami.*
Seventh Division: *Sugi, Sakaki, Matsu, Kashiwa.*

Second Submarine Squadron

Chogei, tender; Rear Admiral K. Hasegawa.
Eighteenth Division: *I*–53, 54, 55.
Nineteenth Division: *I*–56, 57, 58.
Twenty-eighth Division: *I*–59, 60, 63.

First Aircraft Squadron

Kaga (flagship; Vice Admiral S. Takahashi), *Hosho.*
First Destroyer Division: *Nokaze, Kamikaze, Namikaze, Numakaze.*

Ships attached to the combined fleet

Supply ship *Mamiya.*
Oilers *Naruto, Kamoi, Hayatomo.*
First Mine-Sweeping Division: Nos. 1, 2, 3, 4, 5, 6.
Sixth Mine-Sweeping Division: Nos. 7, 8, 9, 10.
Special aviation corps at Saeki—Karasaki, Capt. S. Takahashi.
Special aviation corps at Amami-oshima—Tsushima, Capt. S. Yunokawa.
Special aviation corps at Bako, Twenty-sixth Destroyer Division: *Toga, Kaki, Nire, Kuri;* Commander H. Kaku.
Submarines based on Kure: *Ro*–51, 53.

RED FLEET

Commander in chief, Vice Admiral R. Nakamura flagship, *Nagato.*

THIRD FLEET

Flagship, *Nagato;* commander in chief, Vice Admiral Nakamura.
Sixth Division: *Nagato* (flagship, Vice Admiral Nakamura), *Hyuga.*
Seventh Division: *Furutaka* (flagship, Rear Admiral K. Ijichi), *Abukuma, Kitagami, Tama,* (simulating 10,000-ton cruisers).
Eighth Division: *Natori* (flagship, Rear Admiral K. Terajima), *Oi, Jintsu.*

Third Destroyer Squadron

Yubari, flagship, Rear Admiral S. Matsuyama.
Fourth Division: *Tachikaze, Hakaze, Hokaze, Akikaze.*
Fifth Division: *Harukaze, Hatakaze, Natsukaze, Asakaze.*
Eighteenth Division: *Isokaze, Hamakaze, Tokitsukaze, Amatsukaze.*
Twenty-third Division: *Yuzuki, Kikuzuki, Mikazuki, Mochizuki.*

Fourth Destroyer Squadron

Tatsuta, flagship; Rear Admiral S. Kobayashi.
Fourteenth Division: *Kawakaze, Tanikaze, Kiku, Aoi.*
Twenty-eighth Division: *Hasu, Yomogi, Tade.*
Twenty-ninth Division: *Yunagi, Oite, Hayate, Asanagi.*

Third Submarine Squadron

Tenryu, flagship; Capt. S. Nobeta.
Fifth Division: *Ro*–11, 12, 13.

Fourth Submarine Squadron

Kasuga, flagship; Rear Admiral H. Ono.
Fourth Division: *Ro*–54, 55, 56.
Sixth Division: *Ro*–57, 58, 59.
Twenty-seventh Division: *Ro*–65, 66, 67.

Fifth Submarine Squadron

Isuzu, flagship; Rear Admiral Shigeoki.
Seventh Division: *I*–4, 3.
Ninth Division: *I*–24, 22, 21, 23.
Twenty-ninth Division: *I*–61, 63, 64.
Aircraft Squadron: *Akagi* (assumed to be superior to Blue Air Force).
Twenty-fourth Destroyer Division: *Kashi, Yanagi, Momo, Hinoki.*
Auxiliaries: *Tsurumi* (oiler), *Erimo* (oiler) *Otomari* (ice breaker).

EASTWARD EXPANSION OF ITALY

Query: What actions have been taken by the Government of Italy or what pronouncements made by public officials which would indicate that Italian foreign policy is directed toward expansion to the eastward?

DISCUSSION

FROM THE DAYS OF THE ROMAN EMPIRE TO 1870

Ancient Rome as the capital and economic center of the Italian Peninsula found it necessary for her protection against the Illyrians to conquer the eastern shore of the Adriatic. This was accomplished in 78 B. C. with the complete possession of the hinterland. A province composed of this territory was established in 10 A. D. and called Dalmatia.

The same problem of safety was presented to Venice. Throughout her existence the possession of Dalmatia was held of primary importance. This is exemplified by her struggles with Hungary from 1106 to 1409 and with Turkey from 1608 to 1718.

Napoleon, in the treaty of Pressburg, 1806, recognized the necessity of reuniting Dalmatia and Istria to the Italian Kingdom.

Thus the eastern coast of the Adriatic was subject to Italization about 2,000 years ago, constituting thereby the basis for the claim of Italia Irredouts. Likewise the strategic reasons for Italian possession of that shore was recognized in those early times.

From the fall of the Roman Empire until 1870 Italy had no existence as an organized nation or political unity. In the above year, however, Italy was unified and commenced her career as a modern state.

FROM 1870 TO THE GREAT WAR, 1914

During this period there was a rise of Irredentism and a marked desire for colonial expansion in Africa. Territory was acquired in the latter country, but Balkan adventure was blocked by Austria-Hungary. Great indignation was caused in Italy by the Austrian occupation and later absorption of Bosnia-Hercegovina and likewise by the French occupation of Tunis. The latter place was largely populated by Italians and regarded by Italy as a possible area of penetration.

Massawa was occupied in 1885. This brought on wars with Abyssinia, resulting in 1889 in Italian possession of the colony of Eritrea

(west coast of Red Sea). In this same year was founded the colony of Somaliland, on east coast of Africa at entrance to Gulf of Aden.

In 1912 sovereignty was extended over Tripolitania and Cyrenaica as a result of the war with Turkey; the islands of Rhodes and the Dodecanese remained under Italian control pending Turkish withdrawal from Lybia.

The great part of this era was one of territorial imperialism on the part of the European nations. It is but natural that the youthful nation of Italy, possessing no colonies, should follow the spirit of the times.

THE GREAT WAR, 1914–1918

Italy on August 3, 1914, declared for neutrality. Owing to troubles in Albania and the Greek invasion of the southern districts, Italy, in the fall of 1914, occupied the island of Sareno and later on in the winter the town and harbor of Valona.

In negotiations with Austria, Italy demanded, as the price of continued neutrality throughout the war, all the Trentino, the Isonzo Valley, some of the Dalmatian Islands, a free hand in Albania, and the formation of Trieste and northwestern Istria into an independent state. As the replies of Austria were evasive, Italy turned to the Entente, the result being the treaty of London and the entrance of Italy into the war.

On May 24, 1915, Italy entered the war on the side of the Allies. The price demanded for such participation was to be the liberation and annexation of the unredeemed Italian lands still subject to Austria and a favorable solution of the strategic problem of the Adriatic. The (secret) treaty of London, of April 15, 1915, between France, Great Britain, Russia, and Italy contain among others the following provisions:

(*a*) Italy shall receive under the treaty of peace—

Trentino.
Cisalpine Tyrol.
Trieste.
Countries of Gorizia and Gralista.
All Istria, including a number of islands.
Dalmatia and all islands to north and west of Dalmatia.
Full sovereignty over Valona, the island of Saseno, and sufficient surrounding territory for its defense.

(*b*) Italy charged with the representation of Albania in its foreign relations.

(*c*) Sovereignty over the Dodecanese Islands.

(*d*) In the event of total or partial partition of Turkey, Italy ought to obtain a just share of the Mediterranean region adjacent to

Adalia. The interests of Italy will be taken into consideration in the event that Turkey is not divided.

(*e*) Lybia transferred to Italy.

(*f*) Any increases to France and Great Britain at the expense of Germany, the two powers agree in principle that Italy may claim some equitable compensation particularly as regards the settlement relative to the frontiers of Italian colonies of Erstrea, Somaliland, and Lybia and neighboring colonies of France and Great Britain.

In April, 1917, British, Italian, and French governments concluded a convention whereby it was agreed that in a future partition of Anatolia the Smyrna area was to be assigned to Italy. (St. Jean de Maurienne agreement.)

While there was considerable Italian sympathy for the allied cause and in consequence a certain amount of internal pressure exerted to have Italy join the Allies, the above treaties, negotiations, and action at Valona point to imperialism as the primary cause of Italian entry into the war. Some of the demands were justified on historical and strategic grounds, but others had no justification on historical, strategic, or ethic grounds and could only be based on the desire for more territory.

POSTWAR PERIOD TO NOVEMBER, 1922 (ESTABLISHMENT OF FASCIST GOVERNMENT)

In February, 1919, Italian Government presented a memorandum to the peace conference, embodying and justifying its territorial claims, corresponding to those agreed upon in the London conference, but also including Fiume. The latter was included because the national council of that town had in October, 1918, in the name of the Italian majority applied for Italian annexation.

During the absence of the Italian delegate at the peace conference the Allies ignored the St. Jean de Maurienne agreement and decided to send Greek troops to Smyrna. Their landing was immediately followed by Italian occupation of various points of southwest Anatolia and Italian cooperation with British and French in occupying other parts of Turkey. Italy, to conciliate Greece, concluded an arrangement with that country delineating their respective spheres of military occupation and also giving Greece a free hand in southern Albania. It is apparent that Italy was determined to participate in any partition of Turkey even at the expense of some loss in the Balkans.

Disorders in Fiume in July, 1919, due to antipathy of French and Italian troops and sympathy of the former with the Croats, resulted in D'Annunzio taking over Fiume with a few troops and volunteers. He was joined by most of the Italian troops and seamen in the local

area. While the Government protested the action taken, a large part of Italian opinion supported D'Annunzio and many volunteers came to his assistance.

In the treaty of St. Germain (September 19, 1919) with Austria, Italy definitely acquired the northern and northeastern frontiers assigned to her by the treaty of London, plus the Sextena Valley and Tarvia. While this assured the security of the northern boundary, the Adriatic question remained unsolved.

With the exception of Saseno, Italian troops were withdrawn from Albania in the fall of 1920 due to disorders between Italians and Albanians and to internal dissension in Italy. The conference of ambassadors in November, 1921, declared that their representatives in the League of Nations would in case of trouble in Albania receive instructions to intrust the maintenance of Albanian territory to Italy.

In the treaty with Turkey signed at Sevres in August, 1920, Italy obtained economic priority over a wide zone of Anatolia south and east of the Greek zone (Smyrna) in addition to a coal concession. By a separate agreement with Greece, Italy agreed to cede to the latter the Dodecanese less Churki and Castelloryo, which with Rhodes would remain Italian for 15 years and then, if Britain ceded Cyprus to Greece, a plebiscite would decide the destiny of the islands. The latter agreement was denounced by Italy in 1922 in view of the inability of Greece to carry out her share in the arrangement.

In the Rapallo treaty with Yugoslavia in November, 1920, Italy waived her claim to Dalmatia except the town of Zara. The islands of Cherse, Sussin, Logosta, and Pelagosa remained Italian. The free State of Fiume was recognized by both countries. D'Annunzio although refusing to recognize the treaty, was, after some fighting, forced to leave Fiume. In protest over this treaty, Admiral Acton resigned as chief of staff. Vice Admiral Cogni, in command of the Mediterranean Fleet, gave up his command for a similar reason. This treaty was particularly distasteful to the Italian Navy in view of their belief that the possession of Dalmatia was necessary for the control of the Adriatic.

In 1922 the reconquest of Tripolitania was commenced and was completed in 1923.

During this period Italy was confronted with many internal difficulties which threatened the political and social stability of the country. The financial and economic condition was critical. Socialism and communism spread throughout the State. Strikes attended by violence, rioting and pillaging were common. Leadership in high places was lacking. Yet, in spite of these conditions, treaties of

peace were signed as outlined above, and while not awarding all that was demanded in the treaty of London, the terms were distinctly favorable to Italy.

By the treaty of Rapallo about 3,300 square miles of territory and about 910,000 inhabitants were acquired; by the treaty of Saint-Germain, all the Tyrol south of the Brenner Pass, with a population of about 650,000. The total increase in European area amounted to about 7,300 square miles and in population about 1,600,000 inhabitants. A source of possible future weakness, another irridentist situation, in these acquisitions is the great number of non-Italians living in these areas—about 230,000 Germans with Austrian sympathies in the Tyrol and about 500,000 Slavs of Yugoslavian tendencies in the Adriatic possessions.

During this period Italian ambitions for expansion on historical (ethnical) grounds was only partially satisfied. The creation of Fiume into a free State and the possession of Dalmatia by Yugoslavia prevented complete fulfillment. National safety (strategical grounds) is not assured by revision of the existence of the Free State of Fiume in the northern Adriatic and Yugoslav possession of Dalmatia in the eastern Adriatic and the lack of control of the eastern shore of the southern Adriatic. On economic grounds the territory acquired offers little opportunity for Italian colonization or industrial penetration. Nor does it produce the essential raw products needed for Italian industries.

FROM NOVEMBER, 1922, TO THE PRESENT TIME

The advent of Fascist Party to power has been followed by a remarkable change in the internal condition of the country; politically only one party is tolerated, the Fascisti, to which the whole nation is being trained or forced to belong, and at the head of which is the dominating personality of Mussolini. Law and order have been restored even at the expense of personal liberty. Agricultural and industrial development has been intensive. The army, navy and air forces have been rejuvenated and strengthened. Compulsory military training commences at an early age in various forms of Boy Scouts associations and the nation as a whole is being imbued with a military spirit. Italians are being taught by press, books, and magazine articles to think of Italy in terms of the Roman Empire. The patriotism and faith of the people in the future of Italy have been aroused to an extraordinary degree.

The foreign affairs of Italy have been conducted with equal vigor. In the Yaanina affair the latter part of August, 1923, Corfu was promptly occupied upon the rejection by Greece of the Italian demands. It was only evacuated when Greece accepted the decision rendered by the conference of ambassadors in favor of Italy. Musso-

lini, in his speech to the Senate, stated that the prompt action in this case was taken "to raise the prestige of Italy."

In the treaty of Lausanne, July, 1923, between Turkey, Italy, and other powers, Italian possession of the Dodecanese plus the island of Castellorizo was confirmed. However, all former ideas and understandings concerning the partition of Turkey were negatived by the rebirth of Turkey under Mustapha Kemal Pasha. It is understood that Castellorizo has excellent facilities for submarine bases and that Rhodes is being fortified. The retention by Italy of these islands can only be accounted for as of possible future strategic value.

In January, 1924, agreements were signed with Yugoslavia which recognized Italian sovereignty over Fiume. Yugoslavia obtained Perto Baros, the Dalta, and a free customs zone in Fiume and Costuo. This gave Italy control of the northern extremity of the Adriatic.

In the treaty with Albania, concluded in 1926, Italy abandoned Valona to Albania, but with the right to make use of the Bay of Valona when necessary, to shelter or refuel her vessels. Italy retained the island of Saseno and obtained the consent of Albania to the occupation and fortification of Punta Singnetta, the extreme end of the peninsula which closes the bay on the south and of Punta Treporti, to the north of the bay. Another treaty between these two countries, signed in 1927, reaffirmed the above provisions and was in reality a defensive alliance between them. By these treaties Albania becomes practically an Italian protectorate and Italian control of the southern end of the Adriatic is assured. Italian economic penetration has been such as to render Albania financially and economically dependent upon Italy.

Transjuba was acquired from England by treaty with that country in 1925; the Jarabud oasis and the bay of Sollum from Egypt. France has conceded certain minor rectifications in favor of Italy of the Libian border.

Italy has thus, with the exception of Dalmatia, regained almost all of her historic territory around the Adriatic. Strategically the control of the Adriatic is assured. Economically the need for expansion is greater than ever in order to take care of the excess population, to feed the increasing population, to assure sources of supply of raw products for the growing industries, and to absorb the output of such industries. Emigration has decreased due partly to the action of the United States and partly to restrictions imposed by Mussolini. In consequence, Italy is overpopulated. The African possessions have not proved suitable places for colonization nor do they produce or give promise of producing in the near future the essential food products and raw materials to feed the Italian people and to supply the demands of industry.

To acquire a conception of Italian policy regarding expansion, the foreign relations of Italy, statements of her public officials, her internal situation, and the international situation will be examined.

The treaties with Yugoslavia and Albania have been previously commented on. The acquisition of the Dodecanese and Castellorizo can only be accounted for on strategic grounds, which at the present time are not clear. The acquisition in North Africa and East Africa have not proved particularly valuable for colonization or penetration and express merely the desire for territory. They do not compensate for the territory promised by the treaty of London through the partition of Turkey.

Treaties of friendship and commerce have been negotiated with the Balkan States, also with Turkey and Austria. Hungary has been given a free port in Fiume. Italian treatment of her German citizens in the Tyrol has been modified and made more tolerant, possibly with the realization of the error in her former method or possibly with the intent of propitiating Austria. Royal alliances have been consummated with Belgium and with Bulgaria. Very recently negotiations have been under way toward a commercial agreement with Russia. Lacking information to the contrary, these treaties and alliances can only be regarded as ordinary acts of comity between nations, although they have been variously commented on as attempts to isolate Yugoslavia and as endeavors to break the French influence in the Balkans.

Relations between Italy and Yugoslavia and between France and Italy have been the cause of great anxiety to the world. Of special interest has been the Italian approval of Germany's stand (Geneva conference now going on) for revision of the Versailles treaty. It is indicative of a desire for additional territorial gains through a re distribution of the former enemy land.

Close commercial relations with the Balkans, Turkey, and Russia, especially with Russia are particularly advantageous, as they can supply Italy with practically all the food necessary, the raw materials for her industries, and in addition can absorb a goodly portion of her manufactured articles. Such relationship becomes of especial value in case of war with France due to the almost certain stoppage of supplies from the Western Mediterranean. The value of the Dodecanese and Castellorizo now becomes more apparent, as they are so situated as to guard the eastern flank of this trade route. It would appear that with the possible exception of Yugoslavia, relations of peace with the Balkan countries, including Turkey, would be more advantageous economically to Italy than to attempt expansion at their expense.

Italian economic penetration of Albania has been previously commented on. Such penetration has not been confined to Albania alone,

Large loans have been made to Greece, Turkey, and Rumania, with a goodly proportion of such loans expended in contracts to Italian industries. Important concessions have been secured by Italian firms in Turkey and Bulgaria for the development of their natural resources. A commercial treaty has been negotiated with Hungary in which that country was given an outlet with Fiume. Such activities as the above do not point to a policy of territorial expansion in those countries. On the contrary, they require a state of peace. No mention has been seen of similar economic undertakings in Yugoslavia, although such may have been accomplished.

Mussolini in his public utterances has been conflicting. In some speeches he has stressed the need for "peace to complete the process of development." In others he has been extremely bellicose, particularly those made at Leghorn and Florence. However, in his speech at Milan he tacitly admitted the above two speeches had been made for home consumption. His speech to the Facist Directorate of all Italy on October 27, 1930, is significant of his policy and is quoted below:

> Let it be clear, however, that we are arming ourselves spiritually and materially in order to defend ourselves, not in order to attack. Fascist Italy will never take the initiative of war.
>
> As for Italy's policy on the Danube and in the east, it is dictated by reasons of life. We are trying to utilize the last square inch of our territory. What we are doing is gigantic, but soon our territory will be saturated by our growing population. We wish this and we are proud of this because life produces life. * * * Only toward the east can our pacific expansion occur. This explains our friendships and our alliances. * * *
>
> Our foreign policy is sincere, without evasion or mental reservation. A written agreement is sacred for us, whatever may happen, nor do we know of any other means whereby a people can increase their prestige and the confidence others have in it. * * * Italy is an immense legion which marches under the Fascist symbol toward a greater future. Nobody can stop her. Nobody will stop her.

The following extracts from other public officials are quoted:

Grandi in his first speech in the lower house as Undersecretary of State, in May, 1926, stated:

> * * * * * * *
>
> Which is conscious of a great past and, what is more important, which feels that it will renew its past. It is the foreign policy of a young and exuberant people which * * * is destined to expand with a great breath.

Senator de Tullie, in the Senate on March 13, 1926, stated in connection with the execution of the Treaty of Commerce and Navigation with Albania:

> The peaceful Italian penetration in Albania is Italy's first step toward Eastward expansion * * *.

Only a limited amount of weight can be given to public utterances of statesmen or politicians when endeavoring to deduce therefrom a foreign policy. From the examples mentioned or quoted, although conflicting, it would appear as if expansion to the eastward is contemplated, but that such expansion is pacific.

Internally Italy, although suffering at the present time from economic depression with the rest of the world, has been building up her industries to compete in the world markets. Large power plants are being developed to render her less dependent on the importation of fuel. Agricultural possibilities of the land are being developed to the utmost. The army, navy and air forces are being strengthened and brought to a high state of efficiency. Men, women, and children are being inculcated with the military spirit; boys undergo military training. Alien populations in newly acquired territory are being absorbed. It is a process of building and such progress requires peace.

The international situation will only be briefly mentioned. The Balkan States, with the possible exception of Yugoslavia, have been stable since the war, even though several of them contain large numbers of alien citizens, give all indications of continuing so. The recent economic conference between them, held in Greece the past summer, is an encouraging sign of an economic "get together." They are conscious of their entity and resent any attempt on the part of Italy to acquire territory at their expense. Yugoslavia is more or less of a mechanical mixture of peoples and therefore contains possibilities of discord among themselves. France is closely allied with several of the Balkan States and would certainly not tolerate any aggression thereon by Italy. While Austria and Hungary desire to regain their lost territory through revision of the treaty of Versailles, it is not believed that Europe will permit any changes in the territory of the Balkans by that means or by aggression on the part of any other state.

CONCLUSION

From the foregoing it is concluded that Italian foreign policy does not contemplate territorial expansion to the eastward in the immediate future. Economic expansion in that direction is, however, a part of her policy. It is believed, however, that Italy expects that European complications will take place in the not distant future and is accordingly preparing herself internally by building up industries, agriculture, the military forces and the military spirit of the people, and externally by alliances, commercial pacts, and economic penetration of the Balkan States.

10,000-TON CRUISER COMPARISONS

The following tabulation contains some comparative features of 10,000-ton cruisers built, building, or authorized by the five principal naval powers, including the legend number of airplanes carried. Some notes on catapults used by the various powers follow the tabulation:

Ship	Laid down	Completed	Displacement (tons)	Speed	Battery: Main	Battery: Antiaircraft	Torpedo tubes	Catapults	Airplanes
UNITED STATES									
Pensacola	1926	1930	10,000	32.5	10, 8-inch	4, 5-inch	6		
Salt Lake City	1927	1929	10,000	32.5	10, 8-inch	4, 5-inch	6		
Houston	1928	1930	10,000	32.7	9, 8-inch	4, 5-inch	6		
Chester	1928	1930	10,000	32.7	9, 8-inch	4, 5-inch	6		
Northampton	1928	1930	10,000	32.7	9, 8-inch	4, 5-inch	6		
Augusta	1928	1931	10,000	32.7	9, 8-inch	4, 5-inch	6		
Chicago	1928	1931	10,000	32.7	9, 8-inch	4, 5-inch	6		
Louisville	1928	1931	10,000	32.7	9, 8-inch	4, 5-inch	6		
New Orleans			10,000						
Portland	1929		10,000						
Astoria	1930		10,000						
Indianapolis	1929		10,000						
Minneapolis			10,000						
BRITISH EMPIRE									
Berwick	1924	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
Cornwall	1924	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
Kent	1924	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
Cumberland	1924	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
Suffolk	1924	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
Australia	1925	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
Canberra	1925	1928	10,000	31.5	8, 8-inch	4, 4-inch	8	1	2
London	1926	1929	10,000	32¼	8, 8-inch	4, 4-inch	8	1	2
Devonshire	1926	1929	10,000	32¼	8, 8-inch	4, 4-inch	8	1	2
Sussex	1927	1929	10,000	32¼	8, 8-inch	4, 4-inch	8	1	2
Shropshire	1927	1929	10,000	32¼	8, 8-inch	4, 4-inch	8	1	2
Dorsetshire	1927	1930	10,000		8, 8-inch	4, 4-inch	8	1	2
Norfolk	1927	1930	10,000		8, 8-inch	4, 4-inch	8	1	2
JAPAN									
Nachi	1924	1928	10,000	33	10, 8-inch	6, 4.7-inch	12	1	2 (?)
Myoko	1924	1929	10,000	33	10, 8-inch	6, 4.7-inch	12	1	2 (?)
Haguro	1925	1929	10,000	33	10, 8-inch	6, 4.7-inch	12	1	2 (?)
Ashigara	1925	1929	10,000	33	10, 8-inch	6, 4.7-inch	12	1	2 (?)
Atago	1927	1931	10,000	33	10, 8-inch	4, 4.7-inch	8	1 (?)	(?)
Takao	1927	1931	10,000	33	10, 8-inch	4, 4.7-inch	8	1 (?)	(?)
Chokai	1928	1931	10,000	33	10, 8-inch	4, 4.7-inch	8	1 (?)	(?)
Maya	1928	1931	10,000	33	10, 8-inch	4, 4.7-inch	8	1 (?)	(?)
FRANCE									
Duquesne	1924	1928	10,000	35.6	8, 8-inch	8, 3-inch	6	1	2
Tourville	1925	1928	10,000	33.2	8, 8-inch	8, 3-inch	6	1	2
Suffren	1926	1929	10,000	31.3	8, 8-inch	8, 3-inch	6	2	3
Colbert	1927	1929	10,000	31.9	8, 8-inch	8, 3-inch	6	2	3
Foch	1928		10,000	32	8, 8-inch	8, 3.5-inch	6	2 (?)	3 (?)
Dupleix	1929		10,000	32	8, 8-inch	8, 3.5-inch	6	2 (?)	3 (?)
Algerie			10,000						
Madagascar									
Maroc									
Tunisie									
Indo-Chine									
Senegal									

ITALY

Ship	Laid down	Completed	Displacement (tons)	Speed	Battery		Torpedo tubes	Catapults	Airplanes
					Main	Antiaircraft			
Trieste	1925	1929	10,000	36.8	8, 8-inch	16, 3.9-inch	8	1	3
Trento	1925	1929	10,000	36.8	8, 8-inch	16, 3.9-inch	8	1	3
Bolzano	1929		10,000	36	8, 8-inch	16, 3.9-inch	8	1 (?)	3 (?)
Gorizia	1929		10,000	33	8, 8-inch	16, 3.9-inch		1 (?)	3 (?)
Zara	1929		10,000	33	8, 8-inch	16, 3.9-inch		1 (?)	3 (?)
Fiume	1929		10,000	33	8, 8-inch	16, 3.9-inch		1 (?)	3 (?)
Pola			10,000					1 (?)	3 (?)

CATAPULTS

GREAT BRITAIN

While in the past the British are reported as having been somewhat skeptical of the powder-impulse type catapults and have inclined to the development of the air-impulse type, recent information is to the effect that they have now developed a satisfactory type of powder-impulse catapult and that the present trend is toward the latter type installations.

It is understood that the catapult installations on the British cruisers have been designed for accommodating comparatively heavy planes of fighting and bomber types, of weights upward of 5,000 pounds.

JAPAN

It is understood that at present the Japanese Navy uses the air-impulse type of catapult.

FRANCE

The French Navy uses catapults of the air-impulse type.

ITALY

The Ministry of Marine has cognizance of catapult development in Italy. However, the Air Ministry collaborates with the Ministry of Marine in this development. There are two types of catapults in Italy, the "Cagnotto," or air-type catapult, and the "Magaldi," or powder-type catapult.

The "Cagnotto," or air-type catapult, is the one at present in service in the Italian Navy. Its maximum capacity is said to be for a

plane of 6,700 pounds weight. One of these catapults firing over the bow is installed on each of the following battleships: *Cavour*, *Doria*, *Cesare*, and *Duilio* and on each of the following cruisers: *Trento*, *Trieste*, and *Ancona*. Two of these catapults are installed on the aircraft tender *Miraglia*, one located to fire over the bow and the other to fire over the stern. In every case the catapult is of the fixed type. Except in the case of the battleships, the catapult is located along the center line of the ship. On the battleships it is parallel to the center line, but offset to the port side.

Due to the fact that the catapult will not properly function beyond a minimum speed of launching, it would appear that one of the tactical disadvantages of locating catapults on the bow, is that when the ship is steaming into a head wind it is necessary to slow down before launching the plane from the bow catapult if the apparent wind is sufficient to require reducing the catapult launching speed beyond the minimum limit of proper functioning.

It is understood that in the Italian Navy the minimum interval between two successive launchings from the same catapult is 15 minutes.

The "Magaldi," or powder-type catapult, is not yet in service and is in process of development. The reported maximum capacity for this catapult as at present designed is 3,300 pounds. Preliminary tests with this type of catapult were not thoroughly successful due to failure of material. It is understood that electron metal was used in the construction of various sheeves instead of bronze, which is to be substituted for subsequent tests.

EVOLUTION OF GERMAN NAVAL WAR PLANS

By Captain Weniger, German Navy, Retired.

(Editor's Note: The following article contains interesting documentary information on German naval operating plans and is considered of important historical value since it is from the pen of a retired German naval officer.)

ORIGIN

After the War of 1870–1871, it was first of all France that was considered in making War Plans. The use of the Navy was limited to coast defense. However, already under General von Stoch, the first Chief of the Admiralty (1872–1883), the necessity of offensive procedure was emphasized as a necessary part of defensive strategy. Among the records is found a memorandum by General von Caprivi, Stoch's successor (1883–1888), written in his own hand writing in the fall of 1887 concerning the conduct of sea warfare against France. In this memorandum, the possibility of an attack on the northern coast of France is discussed, an attack to be made early in the war before the French Mediterranean fleet could arrive on the scene. A torpedo boat division was to attack Cherbourg, the German battleship squadron which could arrive at the Channel in nine days was to try to engage the French northern squadron, its inferior, so far as possible not westward of Calais. A threat to bombard Calais was intended as a means of luring this squadron. After the battle, or thirteen days later (the arrival of the Mediterranean squadron was expected in from 12 to 14 days after the beginning of the war) the squadron was to return. The motive for the attack is that the Navy "must have a record of success in service,—not mere heroism in going down gloriously,— if it is to develop on a larger scale after the next war," as well as the fact that the hard days of protracted minor engagements along the coast would be more easily endured if at the beginning success were obtained outside of home waters.

General von Caprivi was replaced in 1888 by Vice Admiral Count von Monts, who died, however, at the beginning of 1889. Early in 1889, the organization of the navy was changed. The functions of the Admirality, which up to that time was the only head, were taken over by the High Command of the Navy, the Imperial Navy Office and the Navy Council. The development of the plans of operation was assigned to the High Command, whose first chief was the Commanding Admiral, Baron von der Glotz (1889–1895). His successor

was Admiral von Knorr (1895–1899). In 1899, the High Command was abolished. Its place was taken by six immediate authorities, one of which, the Admiral's Staff of the Navy, was made up of what had until then been the Admiral's Staff Division. From 1899 until the outbreak of the war, seven admirals succeeded each other as head of the Admiral's Staff.

Von Caprivi's idea of an attack on the French coast was taken up by the High Command. This idea also served, under the Admiral's Staff, as the basis for plans of operation in case of war either with France alone or in case of war of the Triple Alliance against the Dual Alliance. Due to the prevailing conditions as to relative strength, operations were planned so as to include short raids from time to time extending to the Channel or even to forgo these attacks. The latter was the case in 1900, when the home fighting forces were considerably reduced by the assignment of many ships to Eastern Asia, among them four of the most powerful battleships. Von Dietrich, the Chief of the Admiral Staff then demanded that security be provided for Borkum and the islands along western Holstein, so that the French might not be able to establish on them bases for blockading craft. In 1909, it was decided that, in case of war of the Triple Alliance against France and Russia, England should always be reckoned with as an enemy and that the plans of operation should be prepared accordingly.

FIRST PLANS AGAINST ENGLAND

It was in 1896 that plans of operation against England were studied for the first time. The motive was to be found in the attitude of the English government and the English press toward the telegram sent by the Kaiser to President Kruger of Transvaal. At first an offensive attack on the English coast immediately at opening of hostilities was planned (England, too, had her main fleet in the Mediterranean at that time and only a small number of ships ready for service in home waters) in the same manner as it had been planned for France. However, that did not mature into a plan (mainly because it was assumed that England would never be unprepared and that she would strengthen the forces in her home waters in due time before the outbreak of hostilities). When at the end of 1897 the number of ships sent to Eastern Asia began to increase (due to the siege of Tsingtau), the offensive attack was dropped; all that could be done was to limit attention to the defense of the coast on the North Sea and to attacks on blockading forces.

Under Vice Admiral Bendemann, the first Chief of the Admiral's Staff, the elaboration of another plan was begun. The main part of the German Navy was to take up its position in the Great Belt pro-

tected by mine fields; the smaller portion was to protect the mobilization of the coast of the North Sea and strengthen its defense. The Kaiser Wilhelm Canal offered quick connection. It was hoped thereby to cause the enemy to divide his forces between the North Sea and the Kattegat or Skagerrak and thus be able to attain some successes by attacks from the Belt on one of the divisions. This plan, also, never took final shape, among other reasons because of certain political considerations on the part of the Imperial Chancellor. It was dropped at the end of 1904. To this should be added the fact that Admiral von Koester, Chief of the Practice Fleet, also raised objections both against the division of the Navy and the basis of the plan.

Admiral von Koester wanted to offer battle to the enemy as soon as possible after the outbreak of the war, with Heligoland (then only weakly fortified) as a supporting point. In this plan, he did not count on victorious results, but rather on inflicting such heavy losses on the enemy that the British Navy would no longer have any superiority over other navies. His plan was, therefore, in accordance with the risk theory of the naval laws. The relative strength of the German Navy to that of England was at that time about: 1:4.5; that of battleships, about 1:4. Of course, a large part of the British ships were abroad, so that in the early days of the war the relative strength was more favorable for Germany. Admiral Büchel (1902–1908), Chief of the Admiral's Staff, did not think the results would be such as expected by the chief of the fleet, in view of the relative strength of the forces engaged. He assumed that even if the results of a battle at the beginning of the war were favorable, England's relative power would be preserved and that by such battle fought early in the war we should help England in attaining her chief aim, unlimited mastery of the seas. He thought it best not to risk the fleet at once, but rather to let it exert its influence as a fleet in being and to inflict losses on the enemy by offensive defensive attacks. Whether or not he was encouraged in this conception from other quarters in 1905 cannot be determined from the records. On the memorandum prepared at the end of 1906 for the instructions concerning the operations of 1907, we find the following remark written by the Chief of the Admiral's Staff on March 19, 1907:

> "Before preparing this second draft of the plan of operations for 1907, a conference was held between the Chief of the Admiral Staff and the Secretary of State of the Foreign Office as well as with the Chief of the General Staff. The Secretary of the Foreign Office was of the opinion that in case of war between Germany against France and England, it would be urgently necessary, in view of neutral sentiment, to avoid success of our foes at sea at the very beginning of the war. Any success of Germany at sea or on the enemy coast, however small it might be, would have an extraordinarily favorable effect.

The Chief of the General Staff expressed his opinion that it would be detrimental to the command of the army if, immediately after the beginning of the war, England were to attain unlimited control of the seas and with it the facility for the transportation of troops whereever she chose."

The Instructions for the operations during the years 1905–1908 contained the order to concentrate all sea forces in the Elbe as soon as possible, to inflict losses on the blockading enemy by raids, but above all to avoid a battle. Battle was to be accepted only in case the enemy risked his ships by advancing under (range of) the coast batteries or if certain victory is guaranteed (1905), or after the Commander of the Fleet had consented (1906–1908). In the Instructions for 1905–1907 it was specifically stated that the date after which full freedom of action would be given to the Commander of the fleet would be decided upon according to conditions of the situation as a whole.

PLAN OF OFFENSIVE

In 1908, Vice Admiral Count Baudissin became Chief of the Admiral's Staff. Through his influence, the plans of operation were changed to the offensive. After reaching an understanding with the General Staff [1] and explaining his object to the chief naval bureaus, he issued the following operation orders for 1909 to the Commander of the Fleet:

"Your mission is to cause the enemy the greatest possible damage by engaging all the forces at your disposal. For this purpose you are to attack the enemy at sea with all the available forces. If the enemy is not encountered during the first advance, certain places along the coast, designated in the enclosure, should be barraged with mines, and enemy sea traffic is to be crippled so far as possible by other suitable measures."

The Kaiser explained that an offensive would be in conformity with his wishes but had not been possible until then. The relative strength between Germany and England was at that time 1:3.5, but for the early days after the outbreak of the war it was more favorable in the North Sea, being about 1:25. The necessity for risking the fleet was justified by the fact that England would cut us off from communication with the world either by an advance on German waters or by closing the outlets of the North Sea and preventing our sea forces from going out. In both cases the situation could not be changed without risking the fleet, and, inasmuch as time plays against us, a long interruption of communication with the world,

[1] The Chief of the General Staff explained that he considered landings in Jutland or Schleisswig as probable, but that he did not consider them as of decisive importance; that it was not of any interest to the Command of the Army that the fleet should not be fully engaged at once.

sapping the resources of the nation in general, it was necessary to be on the offensive at once. Even if the first blow extending to the enemy coast were to be dealt by air, a moral success would be attained and not without some small material gains.

Already in the fall of 1909, Admiral Count Baudissin had been relieved. His successor, Admiral von Fischel, retained the order for the offensive. However, shortly before he took charge, there came an unexpected objection from other quarters. On the first of October, Vice Admiral von Holzendorf had assumed command of the High Seas Fleet, as successor of Prince Henry of Prussia. The new Commander of the Fleet pronounced himself in favor of directing the war from the Baltic Sea through Danish waters. He considered an attack at the beginning of the war as possible only in the summer; he did not think that the war preparations for the entire fleet could be assured before that; he declared himself ready to undertake this attack from Skagen. His opinion was based on the fact that, in view of English superiority, it was necessary to create tactically favorable conditions, which could not be attained in the open sea but which could be had in the Baltic Sea or in Danish waters. Futhermore, the large battleships that were to join the fleet commencing with the fall of 1909 could not pass through the Kaiser Wilhelm Canal; a concentration of the fleet in the Elbe was therefore no longer possible, since the Kiel waters had to be reserved as a practice area. The Admiral's Staff did not believe that the British fleet would press into the Baltic Sea and considered the German littoral of the North Sea as the only possible base of operations. The Admiral's Staff recognized the difficulty arising from the accession of large battleships, but was led by this fact to the conclusion that these ships must always be kept in the North Sea so long as the canal was impassable for them.

The years following passed in exchanges between the Admiral's Staff and the Command of the Fleet concerning this question. The Admiral's Staff did bring about a decision that, so far as possible, the fleet was to be concentrated in the North Sea before the outbreak of the war and that the North Sea was to be considered as the field of operations; further, that advantage should be taken of every prospect of success "by engaging unstintedly the entire fleet". However, the orders of 1910 and 1911 contain the amendment that if the outcome of the first operations were such as to preclude the possibility of success in the North Sea, the Baltic Sea was to be considered as the second and last position. The orders for 1912 were prepared in the fall of 1911, after Vice Admiral von Heeringen had

taken charge of the Admiral's Staff early in 1911. The new order read as follows:

"1—The mission of the High Seas Fleet is to inflict the heaviest damage possible on the enemy at the earliest possible moment by engaging, if necessary, all available fighting forces.

"2—Under normal conditions, the North Sea, including Skagerrak, is to be considered as the major field of operations for the development of the offensive.

"3—Should the conduct of the war be other than offensive, His Majesty will communicate a special order."

The third paragraph seems to have been added at the instance of the Commander of the Fleet; no order of this nature had at that time been prepared at the Admiral's Staff. The orders of 1912 contained nothing but the instructions to concentrate the fleet in the North Sea. This order was set aside because it had been recognized at the Admiral's Staff that the first attack would have to be made from Skagerrak if the entire fleet was in the Baltic Sea at the beginning of the war. Furthermore, the Admiral's Staff adhered to the principle that, on other occasions, the German littoral of the North Sea was always to be considered as the area from which to advance for attack. Accordingly, when it became known, opportunely, from an exchange of notes concerning the removal of the large cruisers to Wilhelmshaven, that the Commander of the Fleet was against concentration at Skagen if the fleet were divided between the North Sea and the Baltic Sea, the Chief of the Admiral's Staff secured in January 1912 an Order in Council which, supplementing the operations orders, provided that, likewise, during the reconstruction of the canal, the concentration of the fleet was to be effected in German waters by use of the canal. This led in January 30, 1912, to joint presentations made by the Chief of the Admiral Staff and the Commander of the Fleet, in which participated also the Secretary of State for the Navy Office and Prince Henry of Prussia, the General Inspector. The result was a compromise. Still adhering in principle to the transfer of all the ships that were too large for the canal as it was then, it was decided that this transfer was not to become effective during the summer following so long as the fleet remained together as a unit and acted as such. By order of the Kaiser, the Chief of the Admiral's Staff and the Secretary of the Navy Office presented their attitude in writing direct to the Kaiser, immediately after the joint presentations had been made. For political, strategic and administrative reasons, Grand Admiral von Tirpitz pronounced himself in favor of the transfer of the large ships to the North Sea and against the Skagen offensive, on the ground

that the return after the battle would have to be made through Danish waters, as England would block all the exits from the North Sea, "and that would necessarily result in the annihilation of our fleet." By advancing from the German littoral, we obtained:

> "In the first place, the chance to fight a battle not far from Heligoland. This chance is psychologically determined by the pressure of the English Admiralty and the English government to fight a battle, by all means, as soon as possible. Furthermore, on this battlefield we shall be strengthened by all the forces of our navy that may be completed in the meantime, among which I count the school ships, the U-boats and 30 small torpedo boats, which can cooperate fully in this area. In the second place, this battle-field offers us an entirely safe return under the guns of Heligoland and thence back to the estuaries of our rivers."

The Secretary further called attention to the fact that any offensive from Skagen led immediately to a decisive battle:

> "This determining situation created by concentration at Skagen I do not consider right, because situations may arise where, for political or strategic reasons of a general nature or such as may be known to Your Majesty alone, it may not seem wise to risk our available forces at once. In the case of systematic concentration of our fleet in the North Sea via the canal, therefore, Your Majesty will retain freedom of decision to the last crucial moment, and will thus be in a better position to utilize the chances of war or its necessities (English army) that may offer themselves but which cannot be foreseen with sufficient certainty."

Vice Admiral von Heeringen, the Chief of the Admiral Staff, gave only strategic reasons in his report of February 6, 1912. He pointed out that the fleet could make attacks from German waters just as well as from the Baltic and with considerably more security. A concentration at Skagen would enable the enemy to fight the advancing parts of the fleet separately. Should events during the first days of the war fail to develop according to our aims, the Skagerrak arrangement would lead to a return to the Baltic Sea. The English fleet would not follow there and apparently would only block the exits from the Belts and the strait. The danger that the fleet would be excluded from any effective action would be great. German waters offered better strategic conditions. It afforded "likewise the facility to postpone the decision when special circumstances actually demanded it."

It must be realized that all these considerations assumed that the Kaiser Wilhelm Canal would not be able to accommodate the large battleships. As soon as this state of affairs was disposed of,—which was then expected for 1914—there disappeared also the difficulty resulting from the fact that if the fleet were in the Baltic Sea at the beginning of the war it would continue to be held there.

One more point should be mentioned, an opinion entertained by the Admiral's Staff before 1912. Until 1909, it was believed that the

enemy would station his blockading forces at the mouths of the rivers, maintaining the major portion close in during the day but farther off during the night. It was assumed that England would seize Borkum in order to be able to utilize the Ems as a supporting point. Up to 1908, the operation orders even mention the possibility that the English battle fleet might attack the coast defenses of the Elbe, the Jade or the Weser. However, as early as 1908, the opinion is expressed that the main forces of the English would always be kept outside of reach of our torpedo boats, and in 1910, this opinion was amplified by a memorandum statement to the effect that the main forces of the English would remain outside of the zone of our torpedo boats and would perhaps even be at anchor in a river so long as the German main forces did not go out to the open sea; that the exits of the North Sea would be blocked and that only light forces would be sent out into the German waters on guard duty. In this connection, it should be remembered that in the spring of 1910 the fortifications of Borkum were completed and that the first German U-boats were " front completed ". The heavy guns of Heligoland were for the most part ready for action in 1912. In the memorandum we have mentioned it is stated, among other things, that for England the war was mainly a business question, that she desired to destroy Germany's fleet, her world commerce and her financial power. But in order that the prize might not fall into the hands of a smiling bystander, England's losses must not be so great as to cause her a transitory loss of superiority in power. That is what imposed fixed limitations on England's offensive. It would be inadmissible optimism for us to assume " that the enemy will out of sheer desire for attack throw himself upon us at a position selected by us precisely because it offers us tactical advantages ". The memorandum is entitled " Baltic or North Sea as Scene of War ". The remark is directed primarily against the proposed Baltic Campaign of the Commander of the Fleet, but is also applicable to conditions in the North Sea.[2]

DEVIATION FROM PLAN OF OFFENSIVE IN FALL OF 1912

In November 1912, the operations order was revised at the Admiral's Staff. The new order approved in the instructions of December 3, 1912, read, as follows:

> " 1—The war is to be directed from the German shores.
>
> " 2—Main task of the conduct of the war should be: to inflict the greatest possible losses on the enemy blockading forces by frequent and energetic offensive attacks both day and night, and under favorable conditions to fight a battle in which all available forces are to be engaged.

[2] We now know that England was planning a close blockade and the fitting out of Borkum as a supporting point. It is only in 1911 that this plan was abandoned.

"3—At your discretion you may conduct a campaign of mine laying on the enemy coast from the very beginning of the war.

"4—The units intended for commerce raiding should be gotten out as early as possible."

In the accompanying instructions, the withdrawal of the offensive of preceding years is supported on the following ground: The English fleet is always in a high state of preparedness; even before the outbreak of the war, light forces would be advanced toward our coasts; under these circumstances, a remote offensive on the English coast could not meet with success. In conclusion, it is pointed out that conditions at the outbreak of the war might be different from those provided for by this order and that, for that reason, it would be wise to send only an abstract to the Commander of the Fleet as instructions for his guidance in the training of the fleet. These instructions read as follows:

"1—The war is to be directed from German waters.

"2—The mission of the High Seas Fleet is to cause damage to the enemy as soon as possible, if necessary by engaging all available forces.

"3—Should a change in these instructions be necessary, an order to that effect will be issued by His Majesty."

From a remark in the records it may be concluded that these instructions were communicated to the Commander of the Fleet by word of mouth. At the beginning of February 1913, a change took place in the Command of the Fleet. However, the new Commander of the Fleet, Vice Admiral von Ingenohl, received neither oral nor written information concerning the operations order. Furthermore, contrary to usage till then in practice, no copy of the instructions was to be sent to the Secretary of State and the heads of the naval stations on the Baltic Sea and the North Sea. On the other hand, as had happened previously, the Imperial Chancellor was informed by word of mouth by the Chief of the Admiral's Staff, in January 1913, of the general plan, namely, that the fleet was to be directed against England from German waters and that the operations were to be conducted on an offensive basis. In the Baltic, there remained a small division intended to try to stop, so far as possible, any offensive from Russia. Should the political and military situation with regard to England allow, parts of the high seas forces would deal Russia a vigorous blow.

By an understanding with the General Staff, there were for several years fixed rules governing the relations toward Danish men of war. No similar practice had been adopted with regard to the Netherlands and Belgium, owing to objections on the part of the General Staff. It is only in 1912 that the Chief of the General Staff communicated his assent. Both régimes stressed the impor-

tance of strict neutrality of the countries concerned so long as they remained neutral. At the beginning of the war, these regimes were combined into one regime and were extended to Sweden and Norway.

Another order, likewise prepared in the fall of 1913, treated the question of doing damage to British troop transports. The considerations urged by the Admiral's Staff were stated as follows:

> "An effective though indirect way of threatening and hence delaying English troop transports is to be found in fighting off the blockaders. The more frequent and energetic the raids on the English blockade, the greater the feeling of insecurity aroused in the enemy and the more difficult it would be for him to decide upon despatching transports. Should the situation require that direct damage be inflicted on the transports, this can be accomplished best by U-boats or by strewing mines around the ports of sailing and of destination. To engage our major forces means at best only success in delaying but not actual damaging of the transport. That does not justify risking the major forces. The advance of these forces would be announced early to the enemy. In view of the long distance to be covered by our forces and the short distance to be covered by the transport trains, the latter would have time to take refuge in safe harbors. Our major forces, exposed to the advance enemy torpedo boats and attacks of submarines, would be compelled to fight a battle against superior forces along the enemy coast and perhaps under tactically unfavorable conditions. Whether any effort should at all be made against transports and, if so, at what time they should commence, those who conduct the war will alone be able to judge on the basis of reliable information and a study of the general situation. It will be for them to issue the necessary instructions."

An order for the Commander of the Fleet was likewise prepared in telegram style: "Damage enemy transports from . . . for . . . , preferably by U-boats and mines. Don't engage major forces without orders."

As to cooperation with the General Staff, an officer who was the director of a division in the Admiral's Staff from 1910 to 1912 communicated the following statement to the Navy Records long after the war: "In 1910 or 1911, a meeting took place during which the General Staff and the Admiral's Staff made known their operation plans to each other. In reply to the question as to what was the attitude with regard to the British expeditionary corps, General von Moltke answered that it would be desirable to have them come to the mainland.[3] At this meeting, General von Moltke further made it clear that he considered it best for the land and sea forces to operate independently of each other, each arm according to the accepted maxims applicable to its element. Should any particular situation require cooperation, it will devolve upon the one needing the support of

[3] The General Staff no longer considered at that time any landing in Jutland or Schleisswig, but only a landing in France.

the other to ask the latter for it; that the most effective support the navy could give to the general conduct of the war would be to inflict damage on England at sea to the extent commensurate to Germany's forces. Notwithstanding this Statement, the Admiral's Staff afterward made a study of the question of crippling the transportation service of British troops; Admiral von Heeringen communicated the results to the Chief of the General Staff and requested that the Navy be called upon for such service if the occasion arose." The officer in question further has no doubt that Admiral von Heeringen informed the Chief of the General Staff of the changes made at the end of 1912 in the operation plans. Admiral von Heeringen stated repeatedly that the Chief of the General Staff took the position that the Navy must do what it considered proper.

At the beginning of 1913, a memorandum was prepared under the title, "Views on the conduct of war from German waters in the North Sea against a superior western enemy." The memorandum was submitted to the Commander of the Fleet, to the Secretary of State for the Imperial Navy Office and to both station chiefs. It opens with the following statement:

> "For the present our forces are by no means sufficient to undertake an offensive immediately, on a grand scale aiming to wrest the mastery of the seas from a foe superior in every class of ships.
>
> In such war, therefore, we must aim at first to inflict losses on the enemy by frequent and repeated raids.
>
> The time and extent of these raids must be so fixed as to assure us the chances of success.
>
> The basic condition is to hold our forces together so as to have the maximum possibilities for local superiority in any clash with the enemy forces. Hence, no detachments for side issues; cruisers not farther than necessary from the major forces; torpedo boats at their stations.
>
> Whether a distant advance against parts of the enemy's major forces at the beginning or during the course of the war offers us the necessary chances can be judged only by conditions actually existing in any particular case. This involves particularly the availability of information concerning the movements and state of preparedness of the enemy major forces.
>
> The situation may also arise in which we would encounter superior light enemy forces in the vicinity of our coast, while we would have no information concerning the major forces or have it in an inaccessible condition.
>
> In such case, it would not be advisable to direct our attack at once against the enemy major forces, excepting long distance raids by U-boats, because the advance light forces of the enemy would close in on our fleet at once, rendering it impossible to shake them off in the course of the advance, owing to their concentrated superiority; they would defeat every effort at scouting; they would try to inflict losses by night attacks and bring the enemy major forces in the greatest strength. To this should be added the fact that, in such distant ad-

vances we are, first of all, not sure of the cooperation of our torpedo boats, due to their limited sea worthiness and radius of action. In view of the importance torpedo boats are to us in day battle, this is of great, even if not decisive, significance.

In such case, therefore, it is evident that we must direct our attack against the enemy blockading forces. If we succeed in inflicting considerable losses, then either the enemy must give up the blockade of our coast (in which case, however, his maritime interests would no longer be sufficiently secure), or he must strengthen the blockade by calling in the major forces or part of them (in which case we shall have the opportunity to inflict losses on the major forces by U-boats and night attacks as well as to fight a battle in our own waters before long).

A battle in the open sea offers us greater chances than anywhere on the enemy coast, particularly because, not being far away from our base of operations, we can utilize weather and winds to greater advantage and be sure of the cooperation of our U-boats and torpedo boats."

Then the memorandum goes on to say that the first aim of the raids must be the enemy blockading forces of every class; however, that as soon as the enemy brings his major forces into German waters, battle takes the foreground, and the choice of the moment is to a certain extent in our hands. The memorandum continues:

"It will therefore be possible to avoid bad weather, winds unfavorable for our attack or absence of torpedo boats due to transitory difficulties. A certain numeric superiority of the enemy should not serve as a ground for delaying the battle, provided conditions are otherwise favorable to us."

In the winter of 1913–1914, a war game was staged by the Admiral's Staff, in which the German Fleet, immediately after the beginning of the war, undertook a raid on the Firth of Forth. Shortly after setting out on its return, it was engaged in battle by superior English forces. What is worthy of mention is the fact that the Commander of the "English" side stated that the blocking of the canal and of the northern exit of the North Sea constituted the only means of forcing the German Fleet to battle by constantly increasing pressure on commerce; further, that in view of the efficiency of the German submarines (used in the war game) the Firth of Forth was no longer a suitable point of support; "under present conditions, it would be better to establish one considerably farther north, somewhere in the neighborhood of Scapa Flow." The Chief of the Admiral's Staff gave an account of the war game in his direct report dated May 26th, 1914. The memorandum for this report closed with the following conclusion:

"With our present relative strength, the offensive should not be pushed so far as was done in the war game. In any case, the prospect of success would not be sufficiently great to justify such a considerable risk. For the present, therefore, we shall have to be content with

employing only our U-boats and mine layers for distant offensives extending to the enemy bases, but soon we shall use our major forces in a persistent and energetic campaign against the ships patroling German waters. Thus, we must constantly push the enemy blockading line farther out, because we thereby compel the enemy to engage more and more ships on a distant, naturally weak and easily broken line, we thus prevent him from observing our bases and concentration areas and render difficult any raid by his submarines and light surface craft. For ourselves, we render German waters secure for the movements of mobilization despatch boats and for continuous drill of our forces. When, through the efforts indicated, the enemy has been so reduced as to render strong the probabilities for complete success, then, and then only shall we engage the whole fleet for a decisive issue."

On the memorandum for the report we find the following remark:

"His Majesty was in accord with the conduct of the war game and the conclusions drawn from it. 'In all cases of defensive, sight should not be lost of the offensive.' His Majesty attaches great importance to close cooperation of the U-boats with the High Seas Fleet and the participation of the former in battle.

(Signed) VON POHL"[4]

DAYS OF STRESS

The records do not contain any further considerations or preliminary studies for the conduct of the war in the North Sea. There is only one sketch prepared on July 30, 1914, by the administrative officer, and issued the same day with some modifications. Both the sketch and the final order differ on some points from the order issued in the fall of 1912; the mine war on the British coast was no longer left to the discretion of the Commander of the Fleet but was to be ordered like the submarine warfare then about to be added. The aim to even up forces reechoes again. The Order issued July 30, 1914, is as follows:

"His Majesty the Kaiser has given the following orders for the conduct of the war:

"1—The aim of the operations should be to inflict losses on the English fleet by raids on the patrols or the forces blockading German waters as well as by unrestrained mine laying offensive and, if possible, submarine offensive carried on the British coast.

"2—After the forces have been equalized by such warfare, and after the necessary preparations and organization have been effected, an effort should be made to engage our fleet in battle under favorable conditions. Should a favorable opportunity for battle arise earlier, advantage should be taken of it.

"3—War on commerce, etc . . ."

Together with operations order were issued the instructions prepared in 1912 concerning the attitude toward transports of English

[4] Admiral von Pohl was appointed Chief of the Admiral's Staff March 30, 1913.

troops and that toward neutral countries (northern kingdoms, the Netherlands and Belgium). On the 1st of August, 1914, the following statement was issued:

> ". . . . . All information available indicates that England intends to transport to Dutch and Belgian ports the Expeditionary force that is being concentrated in Essex. It is assumed that the 1st English fleet will closely blockade the German waters, the 2nd and the 3rd[5] fleets with their numerous cruiser squadrons will cover the transportation of troops. 3rd English fleet frequently cruising, August 1 at 2 a. m., in the Dover-Calais Straits. No further information concerning the 2nd fleet and the state of preparedness of the expeditionary corps."

As stated in a pamphlet issued by the Admiral's Staff, May 1914, entitled "Data concerning the English Navy," in case of blockade the inner stations were expected to be along the Ambrum-Spiekeroog line; in case of distant blockade, we counted only on observation of our waters by advanced forces.

In the early days of August, even before England had issued her declaration of war, the suggestion was made in the Admiral's Staff that the proposition be made to the Danish government to neutralize the Belts and the Sund and block them by mines. After the Danish government had declared itself ready to do so, the proposition was likewise made to the Swedish government to block its part of the southern passage of the Sund, the Flintrinne (Flint channel). But Sweden refused. In a draft of the report of August 7, 1914, the following statement is made concerning the blocking of the Belts:

> "We have thus secured increased assurance against incursions of enemy forces in the Baltic; and from our side we have given up the possibility of directing an offensive from Skagerrak or Kattegat. But this enables us to concentrate our forces entirely on the German littoral."

AT WAR

It soon became evident that England did not intend to establish a blockade but only a submarine coast patrol. Notwithstanding the thorough scouting activities in and in the vicinity of German waters, no other enemy sea forces could be sighted during the first two months except on August 28 and September 10. On August 28, there were clashes west and north of Heligoland; on September 10, the enemy forces were seen only west of the mouth of the Ems on a westerly course. Some successes had been attained by our own submarines and by mines; but that did not bring the desired equalization of forces. Until the end of September, no large enemy battleship had yet been sunk. In the second half of September, plans were made for a dash by the large cruisers into Skagerrak to capture

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[5] According to our (German) information they consisted of 26 older ships of the line.

some enemy cruisers. The intention of the Commander of the Fleet to go with the capital ships as far as Horns Riff in order to cover the cruisers on their return trip had to be abandoned upon a telegraph order of September 19 from the main headquarters. The Chief of the Admiral's Staff feared lest an advance to such remote meeting point might lead to a battle under unfavorable conditions. On the evening of September 24th, the Admiral's Staff at Berlin received a report that the British fleet had entered the Great Belt in the afternoon, after the mine barrage had been cleared by mine sweepers. By order from main headquarters, the light craft of the fleet were immediately despatched to the Baltic, and measures were taken for the passage of the Battleship Squadrons through the canal. On the 25th of September, this report was found to be a false alarm.

The events of the first six weeks of the war convinced Admiral von Ingenhol, the Commander of the Fleet, that the conduct of the war had to be changed. Pointing to the fact that results can be expected only through our own initiative, at the end of September he suggested that he be given permission to advance with the entire fleet outside of German waters, even if such move involved the risk of clashing with superior enemy forces. He further called attention to the disadvantages resulting from blocking the Belts, and proposed that they be reopened. These proposals were refused. The Commander of the Fleet received orders from main headquarters at the beginning of October to avoid actions that could lead to appreciable losses, that the fleet was not to be exposed to engaging in battle with superior forces, that the moment for engaging the entire fleet had not yet come. Limited warfare with submarines, torpedo boats and mines was to be encouraged, but even these craft should be carefully preserved so they would not be lacking after the occupation of the Belgian-French coast. Favorable opportunities to do damage to the enemy should be utilized, but in doing so considerable losses should be avoided. An advance of the large cruisers would be allowed. The reason given for this order was the usefulness of a fleet ready for battle in releasing troops that would otherwise be necessary for coast defense and in the influence it exerted on neutrals.

The engagement of the fleet was temporarily refused by this decision. The permission to use the large cruisers for an advance was utilized by the Commander of the Fleet in sending them once in November and once in December to bombard the fortified cities on the English coast, in the hope that England would thus be induced to send her fighting fleet or part of it into the southern part of the North Sea, thus exposing it more to attacks by mines and submarines. On both occasions, the battleship squadrons accompanied the large cruisers about half the way. In November, the first success against

an English capital ship became known: the *Audacious*, a ship of the line, had got into a mine field north of Ireland and sank at the end of October. The mines had been laid by a German auxiliary cruiser. From the begining of December and thereafter, reports were repeatedly received concerning impending attacks by the English. According to some reports, the intention was to block the mouths of the German rivers. No attempt was made, however, to do so. English forces were rarely seen at this time. On the 24th of November, enemy ships had got near Heligoland. However, at the first firing from the fort they turned around and fled. On Dec. 25, unsuccessful air attacks were made on the Hangars of Nordholz and on ships in the Jade and the Weser. On Jan. 19, a large number of English ships were sighted by fliers 55 knots north west of Heligoland. An hour and a half later, however, they were reported as getting away on a westerly course.

In the meantime the Bureau of Sea Operations at the Main Headquarters had become convinced that the instructions of October 6 were too limiting in their nature. What may have contributed to this conclusion is the fact that the hope of occupying the French channel coast was not to be realized in the near future. On the 10th of January, 1915, the following instructions, approved by the Kaiser, were issued to the Commander of the High Sea Forces:

> "The Commander of the High Seas is authorized to undertake, at his own discretion, more frequent raids in the North Sea with the object to cut off advanced enemy forces and to attack them with superior forces. In doing so, he is to avoid, so far as possible, encountering superior enemy forces, as, in view of the existing general situation, in which the High Seas Fleet has such important significance as a diplomatic instrument in the hands of the Commander-in Chief, a sea battle with unfavorable results would have an unfortunate influence.
>
> Any plans for more extensive raids on the enemy coast should be previously reported to his Majesty the Kaiser."

On January 24, 1915, German cruisers and torpedo boats fought a battle off Dogger Bank with English cruisers and torpedo boats, in which the German cruiser *Blücher* sank. This battle led to the relief of the Commander of the Fleet. He was succeeded by Admiral von Pohl, till then Chief of the Admiral's Staff. Admiral Bachman became Chief of the Admiral's Staff. By order of the Kaiser, Admiral Bachman presented, on the 1st of March, a memorandum concerning the conduct of sea warfare, in which is found, among others, the following passage.

> ". . . . . The engagement of our fleet under conditions that must lead to the danger of being essentially destroyed is not, in my opinion, justified, in view of the unfavorable influence that it must have on neutrals, because there would no longer be any guaranty for the security of the German coast and the Navy would cease to act as a diplo-

> matic instrument. The supposition that, even after a decisive victory over us, the English Navy would cease to consider itself as the first in the world, should not in my opinion receive as much consideration as the glaring fact of the annihilation of our fighting power at sea. The present overwhelming superiority of the English Navy and the vast resources of England will render possible the restoration of her superiority over the next largest navy in question in a relatively short time, while we shall require years before we can again have any Navy worthy of the name.
>
> "This general viewpoint, however, does not exclude the raids allowed by your Majesty as advocated by the former Chief of the Admiral's Staff."

The new Commander of the Fleet carried out, in the course of 1915, seven such raids with the entire fleet. The hope to attain success against advanced forces was not fulfilled. No enemy forces other than submarines were ever sighted. The raids did not, of course, extend very far. The bulk of the ships of the line did not advance farther than 120 knots from Heligoland, and even that distance only when air scouting was possible. The cruisers were not generally sent much farther.

At the beginning of 1915, English mines were laid for the first time in German waters, in the vicinity of Amrum Bank, along the lane assigned to neutral merchant ships as an approach to the coast. From the middle of May on, further mine barrages were noticed in the area between Harris Riff and the Dutch Islands, hence about 40 to 60 knots from Holland. The effectiveness of English mines made it necessary to strengthen the mine sweeping force, but brought with it also the advantage that these mine fields could be incorporated in the German defensive system while the location of outlets for the German expeditions could be shifted. It was to be assumed that the English Navy would not penetrate these regions in the course of any effort to cut off the German fleet or parts of it. This advantage did not, of course, become apparent for some time, until the beginning of 1916. As Commander of the Fleet, Admiral von Pohl, like his predecessor, found it very disadvantageous to have only one avenue for advance and return. Accordingly, at the beginning of June, he proposed the opening of the Belts, a proposal which, however, was not accepted, just as he himself, in October 1914, had refused to accept it as Chief of the Admiral's Staff.

Early in January 1916, Admiral von Pohl got sick and soon died. His successor was Vice Admiral Scheer. In the fall of 1915, Admiral von Holzendorf had been named Chief of the Admiral's Staff after Admiral Bachman had retired due to differences of opinion with the Imperial Chancellor on submarine war on commerce. Admiral Scheer proposed to give the sea operations an

offensive turn. He had the Fleet Staff prepare a program of operations; the basic idea was as follows:

> "A. *Basic Principle.* Present relations of strength forbids us to seek a decisive battle at once with the whole English Navy. Our submarine operations must prevent the enemy from forcing such battle upon us.
>
> *B. Conclusion.* By persistent systematic provocation we must eventually force the enemy to advance some fighting forces against us from his present waiting position, which would give us favorable opportunities for attack; on the other hand, we must thereby prevent the enemy from getting such feeling of superiority as not to hestitate to force us to fight at his pleasure.
>
> The extensive areas of attack offered by the enemy gives us the advantage of always being able to be on the offensive with our inferior forces.
>
> *C. Practical routes* . . ."

The Kaiser approved the propositions of the Commander of the Fleet during his visit to the Fleet, February 23, and stressed his accord at the meeting of the Admirals and Commanders. In the orders of January 10, 1915, it was provided that the Commander of the Fleet was to avoid, so far as possible, encountering enemy superior forces. These instructions were not, of course, specifically cancelled. However, the consent given by the Kaiser to the propositions of the Commander of the Fleet offered a release from this annoying restraint so difficult to comply with. The new conduct of the war soon led to clashes with the enemy and, after another bombardment of fortified English cities along the coast, it furthermore caused the English battle fleet to come again, rather often, into the southern and central part of the North Sea. This war policy found its climax in the battle of Skagerrak (Jutland). Even after that, distant raids by the fleet or ports of it were planned and in part executed. In such cases, whenever the whole fleet was to advance to the vicinity of the enemy coast, Admiral Scheer proceeded with air scouting as a preliminary condition. When once, at the end of February 1917, his plan did not provide for air scouting as absolutely necessary, orders came from the main headquarters that the plan be executed only if air scouting was possible. In connection with a plan prepared May 1917 by the Command of the Fleet, the Chief of the Admiral's Staff communicated the following statement of the Commander-in-Chief:

> "I shall accept your recommendation of the enterprise on condition that the Chief of the High Seas retain well enough in hand the choice of causing a timely cessation, so as to be sure of obviating a battle against superior forces under conditions tactically and strategically unfavorable. Such a decisive engagement of my fleet is reserved to my own orders, to be determined by the general war situation."

Thus the engagement of the fleet was again made subject to the decision of the Superior Direction. No reason can be found for it in the records. Perhaps the hopes placed in the effects of unrestrained submarine warfare contributed to it; perhaps, too, the fact that the relative strength in capital ships was at this time, according to our information, 1 to 2 (24 to 48), and that after the entry of the United States into the war we had to count on a further addition of capital ships on the enemy's side. In July 1918, Admiral Scheer succeeded Admiral von Holzendorf as Chief of the Admiral's Staff. No change resulted for the time being in the use of the fleet. It is only in October 1918, after submarine war on commerce had ceased at the demand of the enemies' league that Admiral von Hipper, Commander of the Fleet, received the order to engage the fleet in a battle. The order was not executed because, due to certain happenings on October 29, the Commander of the Fleet considered the morale of the men so poor on the day before the intended advance that an advance to battle was impossible. The widely published report to the effect that the men prevented the fleet from putting to sea by tearing out the furnaces and by other misdoings is not true.

SPECULATION

A survey of the evolution undergone by the principle of operations appears to reveal the fact that at the outset the main question was: "offensive raids at the beginning of the war or not?" later, it developed into the question: "Offensive by staking the whole fleet or not?" In the years 1909-1912, the Admiral's Staff wanted an offensive staking the entire fleet; from 1913 on, no longer so. There are good grounds to be adduced for each of the conceptions. An offensive with the entire fleet would soon have led to battle. A German victory would perhaps have had a decisive influence on the war. In view of the considerable numerical inferiority, victory could at best be hoped for but not counted upon as probable. It was possible, however, that in such battle the English Navy might suffer such heavy losses that it would no longer be a means of political power and that England could no longer exert any pressure in determining the attitude of neutral countries (not even on that of Italy). Such an effect would have been in conformity with the theory of risk of naval laws. On the other hand, consideration had to be given to the consequences to be met in case of unfavorable results. There was the danger that our sea communications might be entirely cut even in the Baltic, that enemy troops might be landed on the German coast, and that part of the neutral countries, such as Denmark, might be compelled to take sides against the Central Powers. The decision, therefore, on the immediate offensive of the Navy depended

on the effect to be expected from risking it in battle. If a favorable effect could be expected, even in case of loss of the greater part of the Navy, an order could be issued for an offensive engaging the entire fleet. The only remaining alternative was to let the navy act as a fleet in being and to inflict damage on the enemy by petty warfare. If such policy resulted in an equalization of forces, which was at best to be expected only if the enemy decided to block the North Sea, the prospects of success by risking the entire navy would be enhanced. It could furthermore be hoped that successes of the army (e. g., occupation of the French channel coast), or diplomatic successes (e. g., a new alliance, or pressure of neutrals on England) might improve the strategic situation at sea. In 1914, as the clouds of war were approaching, the English navy was fully prepared as a result of the mobilization maneuvers. This factor could only tend to strengthen the disposition of the Admiral's Staff to avoid staking the navy at once.

The disadvantages incurred by a blockading fleet were realized very early and constituted an additional reason, in 1909, for the order given the German fleet for an immediate offensive. Although the disadvantages of the blockading fleet increased in the years following (a more favorable proportional strength for us, increase in the number of submarines, completion of the fortification of the islands and the port of Heligoland), the Admiral's Staff did not entirely dismiss the idea of a blockade, and even of a close blockade, during the years immediately preceding the war. True it is that the operations order of 1914 spoke of the *blockading* or *patroling* forces, but in the memorandum of 1913 and that of 1914, the fight against *blockading* forces, the rolling up of the blockading line, is held out as the first aim; and on the 1st of August 1914, word was even sent out that a close blockade was assumed at least during the transportation of the troops. The question whether a stronger curb could not be put on the enemy had been examined during the years immediately before the war but it does not appear that it was considered possible. In 1909, such possibility was considered and the plans of operation were shaped accordingly. It is to be regretted that the same was not done also in 1914.

Apparently, the proposition to neutralize the Belts and the Sund had not yet come up at that time. Even if the German waters in the North Sea had to constitute the main base of operations against England, there was no ground for giving up deliberately the second route for advance and return in such undertakings and thus diminishing also at the same time the strategic value of the Kaiser Wilhem Canal. That the security to be obtained by blocking the Belts against incursions of English forces had been considered of small value was shown on September 24, 1914, when, upon a false report

about the breaking of the barrage in the Great Belt, counter measures were taken immediately and offensive movements against the Russian coast were suspended—and with good reason. An undefended mine barrage does not form any obstacle to speak of for a resolute foe. Internationally, the proposition for neutralization and blocking had no foundation. Transit through the Belts and the Sund had to be accorded to warships of belligerent nations. Denmark and Sweden had only the right and duty to prevent these waters from being used as bases for war enterprises. The blocking of the Belts by Denmark could have been contested by England. So far as we know, no such thing happened, obviously because England could not see in this blocking any disadvantage to her war operations.

After the war, the criticism was made that the operations order was not clear; that the first clause under figure 2, to the effect that only *after the equalization* of forces and *after* all forces had been duly prepared an effort should be made to engage the fleet in battle under favorable circumstances contradicts the second clause, which is to the effect that favorable opportunities for battle should be utilized even *before* that equalization. However, when it is realized that the order presupposed a blockade or patroling of German waters and that the Admiral's Staff assumed that losses of forces engaged in such blockade or patrol would sooner or later compel the enemy to bring in major forces (Memorandum of February 1913), the order becomes more clear. What the Admiral's Staff considered as a favorable opportunity was also defined in the memorandum: entrance of the English fleet into German waters, preparedness of all torpedo boats, favorable winds for the use of artillery.

In considering the question of hampering transportation of English troops, the Admiral's Staff came to the conclusion that to engage the fleet would only mean to postpone or delay transportation. This opinion was no doubt sound. An advance by the fleet or a large part of it could not remain unnoticed. The enemy would have time enough to detain his ships. To engage the fleet in such an enterprise would, therefore, have been justified only if some decisive effect could be expected from such delay. But before and after the outbreak of the war, the Chief of the General Staff stressed the fact that it was not necessary to hinder or delay these transports.[6] Nor was the use of the fleet for other purposes demanded by the General Staff; nor did the General Staff show any more interest in retaining the fleet for the purpose of protecting the coast.

Cooperation between the General Staff and the Admiral's Staff was closer than we were led to believe by certain revelations made shortly after the war. That does not mean that their cooperation

[6] It was on September 15, 1914, that the Army Command for the first time asked that the transportation of troops be hampered.

could not have been closer. It has been said on some occasions that the Admiral's Staff failed to communicate to the General Staff the proposed weakening of the offensive at the end of 1912. This assertion would be true if we were to consider as valid only what is found in the records of the navy files. In these records, however, we likewise fail to find anywhere a word about the plans of the General Staff. Hence, it would be just as logical to infer that these plans were never communicated to the Admiral's Staff. But such inference would be erroneous. The plans of the General Staff were made known to the Admiral's Staff, but this knowledge was limited to a very small number of officers. It is very evident that the view of a then division chief of the Admiral's Staff, already reproduced in these pages, to the effect that the change in the plans of the Navy was communicated to the General Staff, is to the point. Inasmuch as the Navy and the Army were to operate independently, this change could have no influence on the plans of the General Staff.

The considerations of the Admiral's Staff always had for their point of departure the principle that, in a war against the Triple Entente, the major forces of the Navy were to be used in the West, that a small force would suffice against Russia and that a stronger detachment would be necessary only from time to time. The course of the war confirmed the soundness of this estimate. The Russians never seriously threatened German supremacy in the Baltic. This plan of the Admiral's Staff was likewise in harmony with that of the General Staff so long as the latter directed its first main offensive along the west. A different situation would have prevailed if, for military or diplomatic reasons (in order to avoid violating the neutrality of Belgium), the General Staff had directed the first main offensive toward the east and limited itself to a defensive on the west.

The diplomatic policy exerted no influence in shaping the plans of operation of the battle fleet. The Imperial Chancellor was informed of the plans of operation in 1913 as well as before or at the outbreak of the war. In both cases he merely took due notice. Whether or not he would also have been in accord if the plans of operation had provided for an immediate engagement of the fleet must remain an open question. In any case it may be stated that the plans of operation of the Navy originated without outside influence. After the outbreak of the war, and more specifically in August 1914, the Imperial Chancellor expressed, on various occasions, the idea that the fleet should be preserved as a means of diplomatic pressure even to the end of the war. Admiral von Pohl was always opposed to this idea, and the Imperial Chancellor does not seem to have insisted on its being carried out. To what extent this idea influenced the decision concerning the use of the fleet cannot be determined from the documents available.

The question whether the fleet should be staked, in other words, the question whether the fleet should be used strategically in an offensive or defensive rôle was, during the first years of the war, the most important problem in the direction of the war at sea. After it became evident that the assumption of the operations order—*blockade* or *patrol*—had not come true, and that mines and submarine operations would not bring about an equalization of forces, the operations order should have been changed. The question should have been examined whether it would not be better to take the offensive and issue an order, or at least give permission for the use of the fleet in battle. There were other circumstances pointing to the offensive. Among them are: abandonment of the hope to occupy the French channel coast, the intention to have the cruiser squadron come home and, later, the information that two English battle cruisers had taken part in the battle of Falkland, thus having weakened to that extent the fleet in the North Sea (Dec. 1914). The relative strength in capital ships, which was favorable early and in the summer of 1915, was becoming more unfavorable from the fall of 1915 onward (March, 21:31; October, 21:36). After May 1915, there was no longer any ground for fearing a landing on the German coast. The English troops were at the Dardanelles; the Russian troops in the grip of the Galician attack. This meant the disappearance of one important reason which, until then, constantly argued in favor of preserving the fleet. Even later there were reasons for taking the offensive: in 1916, when at the request of the Imperial Chancellor unrestrained submarine war on commerce was suspended; and finally, at the beginning of 1918, when the results of submarine commerce raiding fell below expectation.

All these circumstances should have served as a good reason for taking the offensive with the fleet. This is not a realization that came after the war. There was no lack of suggestions to that effect on the part of officers in lower ranks as well as from officers in command. The first Commander of the Fleet, Admiral von Ingenhoe, proposed as early as September 1914 that he be given permission to adopt an offensive course. Previously, Grand Admiral von Tirpitz had spoken about it on various occasions at headquarters. It so happened, unfortunately, that he had expressed himself otherwise a few days before the Commander of the Fleet had made his proposition. The Chief of the Admiral's Staff had asked him on September 16 whether he could inform the Kaiser that he—the Grand Admiral—was in favor of bringing on a battle. Grand Admiral von Tirpitz requested that this proposal be postponed. The following day, he sent a note in which he expressed himself in favor of a battle, but concluded with these words: "For the time being, however, we must postpone battle until Turkey

has finally struck her first blow and until the main decision has been reached on the western front." Turkey entered the war at the end of October, and the main decision on the western front did not come until 1918. Had the Grand Admiral expressed himself in the same terms as the Commander of the Fleet did in his report, Admiral von Pohl would then perhaps have adopted a different point of view. It is only at the beginning of January 1915 that he submitted a memorandum proposing offensive activity for the fleet. But the instructions issued in consequence of this memorandum to the Commander of the Fleet did not leave the latter free to engage the fleet; it contained the restriction that so far as possible an encounter with superior forces should be avoided. At the beginning of 1916, Admiral Scheer, as Commander of the Fleet, was able to present his plans personally to the Kaiser and to secure his consent. Admiral Scheer himself had made the provision that a decisive battle with the entire English fleet should not be sought. Furthermore, full freedom had been given him in the development of his operations, in 1916; but not so from February 1917 onward. In his book entitled, "Deutschlands Hochsee Flotte im Weltkrieg" (Germany's High Seas Fleet in the World War), Admiral Scheer says in this connection that he did not get the impression that the Chief of the Admiral's Staff had advocated the viewpoint of the fleet so energetically as to dispel the misgivings of the Commander-in-Chief.

The use of the fleet was never ordered by the Chief Command until the end of the war. During the greater part of the war, it was expressly forbidden. The orders communicated to the Commander of the Fleet always stressed the importance of preserving the fleet; they demanded results without risk; in October 1914, even without any considerable losses—a demand impossible to comply with and contrary to all experience. Now, after the war, no one doubts that it would have been best to allow full freedom as to the employment of the fleet. If that was considered possible in 1909–1912, it could also be possible in 1913 and 1914. Still more is it to be regretted that during the war that decision was reached only when it was too late. Evidently, if the orders for offensive of 1909–1912 had been retained, no objection would have been raised against them, at any rate such objections could not have been carried through. Once the idea was launched about equalization of forces, the engagement of the fleet only under favorable conditions and the preservation of the fleet as a means of diplomatic pressure, the task became difficult and, as evident from the results, no success could be attained in due time in the efforts to have a different conception prevail at headquarters.

CURRENT ARTICLES OF PROFESSIONAL INTEREST

Revolution, Recognition and Intervention. By Lawrence Dennis. (Foreign Affairs, January, 1931.)

Belligerent Rights of a Violator of the Kellogg Pact. By T. Boye. (American Journal of International Law, October, 1930.)

The Change in the (British) Naval Situation. By Admiral Richard Webb, R. N. (Journal of the Royal United Service Institution, November, 1930.)

The Chemistry of War. By Major F. A. Freeth. (Journal of Royal United Service Institution, November, 1930.)

Dutch Problems in the West Indies. By Amry Vandenbasch. (Foreign Affairs, January, 1931.)

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O. N. I. BULLETIN

FOR CONVENIENCE IN ROUTING

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CONTENTS

GENERAL NAVAL NOTES

BRITISH EMPIRE

ANTIAIRCRAFT DEFENCE—8-INCH CRUISER BATTERY

The following interview with a British Army officer on the subject of antiaircraft battery development in the Royal Navy, appeared in the Hampshire Telegraph and Post of January 23, 1931:

> The technical research in antiaircraft gunnery at Whale Island for the navy, and at Shoeburyness for the army, has reached an extraordinary condition of efficiency.
>
> "The navy have made immense strides in antiaircraft defence," said a senior army officer to a Daily Express representative. "The navy, however, have not progressed so far as we have, for they are dealing all the time with the problem of shooting from a moving platform. Our problem is simpler. We shoot from a fixed platform on the ground."
>
> The success of the gunnery experts against aircraft is said to be due to the mounting of the 8-inch gun which has been fitted in the latest cruisers of the county class.
>
> The mounting of this 8-inch gun allows it to be raised and fired effectively at an elevation of 75° to 80°. At that elevation the gun has an effective range against aircraft of 27,000 feet, higher than any bombing aircraft can possibly fly against a fleet at sea.
>
> There is no doubt that the 8-inch guns of the British Navy, when a battle fleet is at sea, can effectively stop any number of high-flying airplanes. The 8-inch guns, under direct control, will fire a curtain of shrapnel shells through which it will be impossible for any airplane to penetrate.
>
> There remains for the navy the question of low-flying airplanes with torpedoes which would be directed against battleships and cruisers. The work of the antiaircraft gunnery school has been such that in the opinion of gunnery officers there is very little chance of a low-flying airplane penetrating the "sharp" barrage.
>
> If any attacking airplane flies low the blast of the 8-inch gun alone is enough to upset it into the water, no matter what its speed.

COMPLETION DATES OF NEW NAVAL CONSTRUCTION

According to latest available information the following list gives the projected completion dates of British naval vessels during the current financial year:

H. M. S. Keith	March, 1931.
H. M. S. Acheron	April, 1931.
H. M. S. Basilisk	February, 1931.
H. M. S. Beagle	April, 1931.
H. M. S. Blanche	February, 1931.
H. M. S. Boadicea	March, 1931.
H. M. S. Boreas	February, 1931.
H. M. S. Brazen	March, 1931.
H. M. S. Brilliant	February, 1931.
H. M. S. Bulldog	March, 1931.
H. M. S. Phoenix	End January, 1931.
H. M. S. Rover	Do.
H. M. S. Nightingale	Early summer, 1931.
H. M. S. Saguenay	Spring, 1931.
H. M. S. Skeena	Do.

BRITISH SLOOPS

Indicative of the possible trend in design of future British sloops is the following observation by the naval correspondent of the London Daily Telegraph:

> Within the near future a new type of warship may be added to the British Navy.
>
> Under the London treaty we are restricted to a total of 50 cruisers. As one-half of these are earmarked for service with the battle fleet in time of war, and of the remainder several would be absent in dockyard at any given moment, we should probably have less than 20 cruisers available to guard the trade routes of the whole Empire, extending over 80,000 miles.
>
> The dangerous shortage of cruisers has led the naval authorities to cast about for an alternative type of ship, capable of discharging the vital function of commerce protection. It is believed that the problem can be solved without infringing the regulations of the London treaty.
>
> The pact restricts the building of warships of more than 2,000 tons, but vessels which do not exceed that displacement may be built without any restriction as to numbers or total tonnage. This freedom, it is suggested, affords us the opportunity of providing better security for our floating trade.
>
> Thanks to improvements in ship construction and machinery, it would be possible to construct a 2,000-ton small cruiser or sloop of considerable fighting value. While such a vessel could not, of course, face a large cruiser, it would be quite capable of dealing with armed raiders or big submarines, which would be likely to constitute the greatest menace to our merchant shipping.

> The projected type would also have the advantage of cheapness, since it could be built for £500,000 and would cost comparatively little to maintain in commission. In peace time these vessels could be employed on foreign stations or for sundry duties in home waters. In war they could serve as sentinels along the trade routes, and also as convoy guards.
>
> Naval officers whom I have consulted regard the building of these ships as an urgent necessity. An admiral of wide experience believes that "unless we start building well-armed ocean-going sloops in considerable numbers without further delay a future emergency will find the Navy powerless to guarantee the nation's food supplies. From four to six sloops of the new type should be built annually for the next five years, and the Dominion governments should be invited to order similar vessels, which would be of immense value to them both in peace and war.
>
> The type which finds most favor is a vessel of 2,000 tons "standard" displacement—actually about 2,300 tons. She would have internal-combustion machinery of sufficient power for a speed of 17 knots and enough fuel would be carried for a cruise of 10,000 miles. The hull would have antitorpedo bulges and armour protection. Four 6-inch long-range guns, several antiaircraft guns, and depth-charge throwers would constitute the armament. Provision could be made for a light seaplane on a catapult.
>
> Tentative plans of such a vessel have, I understand, engaged the attention of the naval staff for some time, and its merits have been brought to the notice of the cabinet. Under no circumstances could the building of these sloops be regarded as a provocative measure, since they are obviously designed for purely defensive operations and would be of negligible value for offensive purposes.

With reference to the foregoing observation it is of interest to note that on a displacement of 2,000 tons (standard) the proposed design may comprise four 6-inch guns, several antiaircraft guns and depth charge throwers, with a speed of 17 knots and a cruising radius of 10,000 miles with internal-combustion machinery; whereas the present sloops have a standard displacement of 945 tons (*Hindustan* of the R. I. N. recently completed of slightly larger displacement) with a battery of two 4-inch antiaircraft and two machine guns, a speed of approximately 16½ knots, and a fuel capacity of 275 tons with two sets of single reduction geared Parsons turbines. The proposed design compares favorably with the six French sloops described on page 196 of Jane's Fighting Ships, 1930, of a standard displacement of 2,000 tons, with a battery of three 5.5 inch, four 37-mm, antiaircraft, and six machine guns; a design speed of 15½ knots, cruising radius of 9,000 miles, with two sets of Diesel engines. Except in the matter of greatly increased armament, the above designs compare closely with our own latest Coast Guard cutters (see p. 497, Jane's Fighting Ships, 1930).

FRANCE

PROTECTION OF NAVAL BASES AGAINST AIRCRAFT ATTACK

Tunnels built of concrete, to house ships in port, are suggested by Rear Admiral Dequoy (reserve), and by Naval Constructor Rougeron (ingénieur en chef de 2ème Classe du Génie Maritime). The admiral takes his example from the German base at Zeebrugge, and advocates tunnels for the protection of submarines. In a port like Cherbourg it would be possible, he points out, to dig a cave under a hill which comes down to the water's edge.

Constructor Rougeron goes more into details, and also proposes overhead protection for other classes of ships. His article is illustrated with plans of the harbors of Gibraltar, Toulon, Spezia, Brest, and Scapa Flow, plans of Paris and London, and pictures of the bombing of the *Alabama.*

He chooses a bomb weighing 132 pounds containing 88 pounds of explosive, and plans his air attack so as to drop 12 bombs, equally spaced, on an area of 2.4 acres. He finds that a 10,000-ton cruiser anywhere in this area will be struck directly by three bombs, 2 will fall in the water at less than 5 meters from the ship, and two at a distance between 5 and 10 meters. He asserts that these bombs will cause serious damage to light craft especially, and the bombs dropped at the same time by other aircraft of the attack will put the drydocks and repair facilities of the port out of commission.

He estimated that to sow 130-pound bombs in Toulon Harbor, at 12 bombs to 2.4 acres requires 720 (metric) tons brought to the attack, which can be done by 480 aircraft. To attack Gibraltar on the same scale, 110 aircraft are required.

He estimates the cost of overhead reinforced-concrete protection for a vessel to be about 10 per cent of the cost of the vessel. To strengthen his argument that these shelters should be built in time of peace, he cites the findings of the military commission formed at the time of the proposal to connect France and England by tunnel, in 1882. This commission found that, out of 117 wars, 107 were begun without declaration.

PROPOSED TRAINING SHIP FOR FRENCH MERCHANT MARINE

The French Government has requested shipbuilding firms to submit plans for the projected training ship, for officers of the merchant marine, with following proposed characteristics:

Type.—3-masted sailing ship, bark rigged.
Displacement.—2,500 tons.
Motors.—One 500 horsepower auxiliary motor.
Length.—230 feet.
Cost.—$600,000.

It is contemplated embarking the cadets for a period of 6 months each year—2 periods of training of 6 months each. Such a procedure could not very well be carried out on a commercially exploited vessel. Each period of instruction will comprise 4 weeks of port exercise; 4 months of navigation at sea, including pilot exercises, and practice in entering and leaving port; 4 weeks of theoretical studies. The training ship will be kept in commission at the expense of the Government at an approximate cost of 1,000,000 francs per annum.

GERMANY

PROGRESS ON NEW NAVAL CONSTRUCTION

Following is a list of vessels building for the German Navy, giving the percentage completed and the date of completion of each vessel, as of December, 1930:

Vessels	Percentage completed	Estimated date of completion
	Per cent	
Battleship Ersatz Preussen	45	Fall, 1932.
Cruiser Leipzig	70	Fall, 1931.
Ordnance school boat Ersatz Drache	40	Fall, 1931.
Fishery Patrol "A"	40	Summer, 1931.
Fishery Patrol "B"	35	Fall, 1931.

TURKEY

LAUNCHING OF TURKISH SUBMARINE AND DESTROYER BUILDING IN ITALY

On February 5, 1931, the Turkish submarine *Sakarya* was launched at the Cantiere Navale of Menfalcone. This is the first Turkish vessel constructed by an Italian shipbuilding company since the World War.

On February 8, 1931, the Turkish destroyer *Kocatece* was launched at the Cantiere Ansaldo at Sestri. The keel was laid on January 15, 1930. A sister ship, the *Adatene*, will be launched in the near future.

THE NETHERLANDS

According to recent reliable information the following tabulation represents a comparative performance, in fuel consumption, of Dutch

destroyers operating with high-pressure steam as against low-pressure installations:

Speed	Fuel consumption per mile	
	Destroyer with low pressure (275 lbs.)	Destroyer with high pressure (700 lbs. at 350° C.)
	Pounds	*Pounds*
15 knots	151	131
20 knots	267	235
30 knots	579	523
35 knots	871	772

The British destroyer *Acheron*, now nearing completion, is reported as having a designed boiler pressure approximating 500 pounds per square inch. It is also understood that the two French flotilla leaders, *Milan* and *Epervier* (2,480 standard tons), now building at Lorient, are to have a designed boiler-pressure installation approximating 375 pounds per square inch.

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CHILE

CHILEAN NAVAL MISSION FOR PARAGUAY

It is reported that the Chilean Ministry of Marine has contracted with the Government of Paraguay to send a naval mission to that country for the purpose of reorganizing the Paraguayan Navy. It is understood that the mission will consist of two officers. It is further understood that the active work of this mission will begin upon the delivery of two Paraguayan gunboats, the *Paraguay* and *Humaita*, now being built in Italian shipyards.

BATTLESHIP "ALMIRANTE LATORRE" CONDUCTS MODERNIZATION TRIALS

The Chilean battleship *Almirante Latorre*, which has been undergoing modernization in Devonport, England, was successfully put through postrepair trials in the channel in February. It is understood that catapult manufactured in Italy for that vessel will be installed in England before sailing for Valparaiso, via Panama Canal, sometime in March. It is further understood that she will be equipped with four catapults, and carry four airplanes. In addition to being flagship of the active squadron this vessel will be used for training courses both for young officers and enlisted men.

SUBMARINE NOTES

BRITISH EMPIRE

NOTES ON BRITISH O-CLASS SUBMARINES

Following are some notes obtained during a recent inspection of H. M. S. *Odin*, one of the submarines now on the China station. This vessel was laid down in 1927 and commissioned in 1929; displacement 1,475 standard tons. Crew of 56 men, 5 officers.

Hull and superstructure.—The decking which covers the superstructure is all metal and does not run the entire length of the ship; it stops at the forward part of the bridge superstructure and begins again at the after end of bridge. To go from forward to aft it is necessary to work ones way alongside a small fin protruding out from the bridge superstructure, holding on to a small hand rail. There are no cleats of any kind on the topside for securing lines; down in the superstructure there are a few cleats whose use necessitates a man crawling down in the superstructure. There was a small deck winch forward about the same size as on our S-boats. There are two deck anchors which almost completely house within the superstructure. No submerged mushroom anchor is provided. Anchors operated from below by telemotor.

The shape of the hull seemed to be rectangular, with sloping sides and rounded corners. This gave considerably more space down below, as much of the apparatus can be affixed to the skin of the ship instead of several feet inboard like ours. There are no quick-closing water-tight doors on the ship between the compartments. All doors are rectangular with rounded corners, except that between the after torpedo compartment and motor room, which was of rounded German type. The doors are closed by means of old-fashioned dogs, there being one set on either side, but if dogged on one side can not be opened on the other.

Bridge.—The bridge is very roomy. The helmsman is protected by cupped metal plates. Two eyeports can be opened or closed as desired. Gyro repeater located at wheel, and is not in water-tight casing; it is secured with heavy brass cover, of German design, before diving. A small door opens out to the gun platform forward. The gun is a 4-inch. Also on the bridge is a large brass-covered top, about 3 feet across, through which passes the under-

water radio gear. Under the bridge, in the bridge superstructure, is an oil galley range that can be used in good weather on the surface. The gyrocompass used is a Sperry.

Torpedoes and torpedo tubes.—There is no torpedo-room hatch like ours. The loading hatch is used. It is quite roomy and a ladder is used to lead to torpedo room. *There are six torpedo tubes forward.* All torpedos are shoved home by use of the telemotor. In order to load the lower two tubes it is necessary to take up the decking. We raised the deck and saw two torpedoes in place ready to be put in the tubes. There is a small platform running between the tubes, making everything about the tubes very accessible. There is an outside setting device for the gyro, depth, speed. There is a water-tight bulkhead directly abaft the tubes, with two water-tight doors. Doors are not quick closing and are secured with an old-fashioned dog arrangement, and it is believed would take a long time to close the doors. The gaskets showed no signs of ever having been used.

The torpedoes in the racks were 21 inches in diameter, and about 23 feet long; use kerosene for fuel. Exercise heads about the length of those on destroyers. All torpedoes had a cylindrical band over the tails which clamped on the standing part of the horizontal rudder. It appeared to be easy to affix and affords a guard for protection of the propellers, and vertical and horizontal rudders when the torpedoes are being handled. There is a depth gauge and inclinometer forward on the starboard side. All compartments on the boat had telephone connections. Torpedo speed said to be 70 knots at minimum setting—2,000 yards.

In the after torpedo compartment there are two torpedo tubes, same size as those forward. Entry and exit similar to that in forward torpedo room.

Battery compartment, living spaces, etc.—The next compartment aft is the battery compartment, with three sets of cells, 72 in each set. The Exide battery is used. The officers quarters are forward in the battery compartment, next aft are four or five compartments arranged in the manner of those on English trains, the chief petty officers occupying the farthest aft. In the after end of the compartment and under the decking is the sound room, ice machine, and high-pressure pump. The ice machine is the C02 type. The pump a Metropolitan Vickers, direct current motor, compound motor, 220 volts, capacity 1 ton per minute. Looks similar to our low-pressure pump on S-boat.

A tub is installed in the officers' wash room instead of shower.

Central operating compartment.—In the forward part of the COC is the trunk leading up to the gun where seven men are placed

preparatory to surfacing for gun firing; their method being to go to 100 feet, blow everything and shoot up with a good angle. They claim 19 seconds to get off their first shot, which appears possible as the gun is almost the height of the navigation bridge.

In the forward part of the COC is the telephone switchboard, which requires an operator. On port side are the controls for bow and stern planes, vertical steering wheel in forward part, all steering being operated by telemotor, as also the periscopes. There is a mirror which reflects very clearly the magnetic compass located on the bridge. Two depth gauges are generally used, registering 100 feet. When below this two small ones are used which register up to 540 feet. Just forward of the plane controls is their fire-control instrument, which appears to be very similar to our mechanical Ford range keeper. The range is put on an electrical scale which repeats itself on the bridge and on top of the deck gun. Apparently no telephone connection is used for sending out the range and scale, depending entirely on this telegraph. There are nine ballast tanks to each side. All kingstons and vents operated by the telemotor system.

Diving time about the same as ours, 60 feet in 60 seconds.

The commanding officer's cabin is located in the after end of the conning tower, above the COC, and appeared to be quite roomy.

Abaft the COC is the engine room. In the forward part of the engine room on starboard side is a Kelvin Bottomley & Baird sounding machine, similar to the ones on the *S–1* and *S–3*.

Main Engines.—The two Diesels are 8-cylinder, 4-cycle. They had just secured on a charge. There was no smell of oil or gas in the compartment. They can ventilate the engines directly from the bridge or through the boat. Forward of the engines are the engine air compressors, 4-stage. The Vickers people took the engines out of the latest German submarine, made the plans, and had them built at the Chatham dockyards. They can make 19 knots on the surface, but usually cruise at 12 knots. Fuel consumption about 56 gallons per engine at 12 knots, and about 100 gallons per engine at 19 knots. The engines are reversible. Claim to use air starting on charge. Use Diesels for maneuvering alongside except " for final touch," when the motors are used. No evaporating plant on board. Legend fuel capacity of 83,000 gallons. Compensating system used. Can use fuel oil in one ballast tank but not the present practice. Experience trouble in keeping the fuel oil out of the fresh water. Provided with electrical contrivance for getting horsepower of any cylinder simply by pressing button on dial indicating the required cylinder. Each cylinder reputed to have horsepower of 280 at full speed. Below the regular platform running through the engine room there is one below it, making everything on the engines very accessible. The

reversing gear is located between Nos. 4 and 5 cylinders. Rocker arm arrangement seemed to be very similar to our Nelsecos. They appeared to have single-spray valves. It is said that the British are building double-ended Diesels with twin-spray valves for the new boats.

The next compartment aft is the motor room. The motors are completely under the decking. The main switchboard is over the starboard motor.

Periscopes.—Looked through the after periscope (there are two on the boat). It is a Barr & Stroud, 6-power with altiscope. The lower section of tube is about 10 inches in diameter. About 6 feet from top it suddenly slopes in at about a 60° angle. The section above this is about an inch and a half in diameter. The periscope had no clearer vision than our own. It is understood that the other periscope (constructed in the same way) is of 10-power. There are etchings on the lenses similar to ours for getting the range. There is no range-finder attachment. The radio room is in the after part of the the COC and under the regular decking.

Periscope depth for No. 2 periscope, 35 feet.

Radio and sound apparatus.—It is understood that they have a very powerful radio—"as powerful as a battleship." No visit was made to radio room.

The radio mast is a rugged one; near its top are two small telescopic sections. Forward of the radio mast is the center of underwater radio antenna. It branches out forward on a very frail cable. The main radio antenna is a 2-wire type. The oscillator is a Fessenden. Could not learn much about the sound room, but there is a gyro repeater installed by which the operator can give the true as well as the relative bearing. It is claimed that they can send and receive with underwater radio at 200 feet.

Escape equipment.—Their escape lungs are somewhat similar to ours, except larger. Instead of having an oxygen bottle in compartment for charging lungs, each lung has individual oxygen bottle attached to it which is kept charged up. One lung on board for each man. Outside salvage air connections similar to ours. Have no escape hatch like ours.

AUSTRALIAN SUBMARINES TRANSFERRED TO ROYAL NAVY

The two O-class submarines *Otway* and *Oxley*, 1,350 tons, built in England (completed 1927) for the Australian Navy, have been transferred to the British Royal Navy and will leave Australia for assignment to the Mediterranean station in the near future. These boats are equipped with *six bow and two stern torpedo tubes*, and carry one 4-inch gun.

FRANCE

"JULES VERNE," NEW SUBMARINE TENDER, LAUNCHED

The new French motor-driven submarine tender, *Jules Verne* (6,000 tons displacement), was launched at Lorient on February 3, 1931. She belongs to the 1926 program. She was launched with her motors and most of her equipment on board. She will carry four 90-mm. and four 37-mm. antiaircraft guns. She is equipped with two Sulzer Diesel engines, to produce legend speed of 16 to 18 knots. Complement, 9 officers, 44 petty officers, and 180 men. She will also provide quarters for 15 officers, 30 warrant officers, and 220 men comprising the crews of submarines tendered by her. She will be suitably equipped with machine shops, repair and supply activities, etc.

In commenting upon submarine tenders, a recent French report states that had "the *Jules Verne* been substituted for the *Vitry-le-Francois* in escorting the submarines *Joessel*, *Fulton*, and *Nereide* to Madagascar, the *Nereide* would not have had to turn back to Port Said."

It is reported that a tender of *Jules Verne* type is intended to be stationed at Saigon, and another one projected for assignment to Diego-Suarez, on the northern tip of Madagascar. It is also proposed that a submarine tender be stationed at Dakar, in French West Africa.

AVIATION NOTES

BRITISH EMPIRE

NEW FLYING-BOAT SQUADRON FOR BRITISH AIR FORCE

In the 1930 British air estimates provision was made for the formation of one new flying-boat squadron and one new cadre squadron. The former is now taking practical shape. It will be known as No. 210 Squadron, and will be stationed at Felixstowe. The total of flying-boat squadrons will thus be brought up to seven, the others being Nos. 201, at Calshot; 202, at Malta; 203, at Basra; 205, at Singapore; and 204 and 209, at Mount Batten, Plymouth. A squadron consists of 12 planes, 2 flights of 6 planes each.

ITALY

ITALIAN IDEAS ON PREVENTION OF FLAT SPIN IN AIRCRAFT

Information concerning the latest ideas on the prevention of flat spin in Italian aircraft, is as follows:

Flat spin, that is to say, that which takes place at very high incidence when the longitudinal axis of the airplane is slightly inclined below the horizontal, is characteristic of some types of biplanes, especially those which have no stagger, small gap, small tail surface, and center of gravity located towards the rear. As the possibility of spinning depends on the form of the lift curve and on the value of the resistance, the range of incidence in which spinning is possible begins at maximum angle of lift and finishes in general around 40° when resistance has attained a certain value. However, in nonstaggered biplanes of incidence between 60° and 90°, the lower wing acts as a screen to the upper and resistance does not increase in conjunction with the angle of incidence, but can even diminish. In that case another range of angles comes into existence in which spinning may also be possible.

The flat spin, therefore, originates as follows:

The airplane stalls and goes into a normal spin. While the airplane is spinning its incidence increases through the effect of the longitudinal dynamic couple which is created by the centrifugal force, which tends to further increase the stall. If the longitudinal

static stability of the airplane is sufficient the plane recovers automatically. If this is not the case on account of location of center of gravity, incidence increases until the second range of angles is reached and the spin becomes flat.

To get out of a flat spin it is necessary to maneuver in the same way as for getting out of a normal spin, that is to say, put controls at center and the stick forward. In a flat spin the longitudinal dynamic couple is very strong because it grows with the angle of incidence. Moreover, on account of the special orientation of the relative wind sometimes the pilot is unable to neutralize the rudder and therefore the maneuver for getting out of a flat spin is very difficult, due to insufficiency of controls.

In view of the above, it results that to avoid a flat spin it is necessary to do as follows:

(1) Not continue too long in a normal spin because a flat spin only takes place after a certain number of turns in a normal spin.

(2) Stagger considerably the wings of biplanes.

(3) Place the center of gravity of the plane very much forward, that is, increase the stability.

(4) See that the airplane is stable at very strong incidence beyond maximum lift.

(5) Increase surface of controls, especially the elevator, verifying its efficiency also in case of abnormal incidence.

The most radical system to avoid a flat spin is of course that of avoiding also a normal spin, or at least, if the airplane is designed for acrobatics, to have recourse to the use of ailerons that will be efficient even at high incidence. Therefore, all the systems devised for this object such as Handley Page slots, floating ailerons, variable camber wings, etc., are the best guaranty to avoid a flat spin.

Another means to avoid a flat spin would be the increase of the transversal moment of inertia which is effected because with its increase the dynamic couple diminishes. This is difficult to attain, however, particularly in the case of small planes.

The Savoia Aircraft Factory is equipping 20 planes of the S–59 type with Handley Page slots, in accordance with instructions from the Air Ministry. This type of plane is the standard observation light bombing flying boat in the Italian air force, and this is the first instance where planes intended for service use are being equipped with Handley Page slots.

ITALIAN PRACTICE ON EMPLOYMENT OF RETRACTABLE LANDING GEAR ON AIRCRAFT

No Italian aircraft carries arrangements for housing the landing gear. A few experiments have been made on models relative to

large-tonnage machines, for research purposes of an aerodynamic nature. For such machines, taking for granted that the results of the wind-tunnel tests are good, one can state that at maximum velocity (full power) the gain in speed occasioned by retraction of about 50 per cent of complete gear can be calculated at about 4 per cent. This gain, however, diminishes rapidly with increase of incidence in flight and becomes negligible when economic flying is practiced.

BRAKES ON ITALIAN AIRCRAFT

Only within the last year have aircraft brakes come to be employed to any extent on Italian aircraft. Most of the Turismo types of light airplanes and a few aircraft on commercial air lines are now equipped with brakes. The Caproni *Ca. 101*, a light bombing and observation plane, employed principally by the air force in Italian colonies in Africa, is being equipped with brakes. It has been stated that it is the intention to equip fighting planes of the *Cr. 20* Bis type with brakes.

Other than as indicated above, with the exception of some experimental types of airplanes, brakes are not employed on Italian aircraft, and it can be stated that, at present, excluding the Caproni *Ca. 101*, brakes are not used on military planes of the Italian air force.

The Caproni Co. manufactures its own type of brakes for installation on Caproni planes. This is a very simple type of internal-expansion brake consisting of two expanding curved arms, with outer surface covered with brake lining. These arms are secured to and turn about a fixed pivot, the other ends are free to move up and down on a cam which, when turned, forces out the arms against the tension of a spring. This expansion of the brake arms produces the braking effect through pressure on the steel surface of the inclosing drum. It is stated that the Caproni type of brake, as installed, requires considerable effort on the part of the pilot to operate, and that the brake lining, on account of unequal pressure along its surface, requires frequent renewal.

The Societa Anonima Fabbrica Cerchi e Ruoti (Fast) Rivoli (Turin), is the company in Italy that specializes in the manufacture of aircraft brakes, and with the exception of the Caproni Co., manufactures such brakes as are at present used on Italian aircraft. This company claims that its brakes reduce the run of the plane over 50 per cent, and states that its brake differs from other types in that they are mounted on circular brackets. However, there appears to be very little difference between the Fast type of brake and the Caproni type.

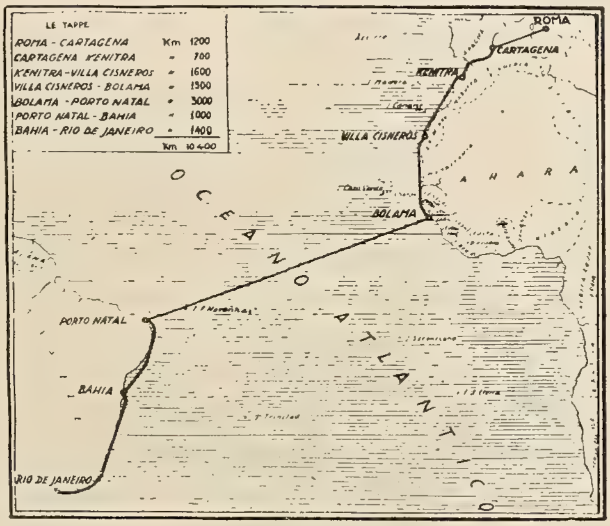
TRANS-ATLANTIC FLIGHT OF ITALIAN AIR SQUADRON

The following notes cover the flight of the Italian air squadron, under the command of General Balbo, from Bolama, Portuguese Guinea, to Natal, Brazil, and the subsequent arrival of the squadron in Rio de Janeiro.

THE FLIGHT

The Bay of Bolama was chosen for the take-off instead of the Island of Bissagos (nearer to Natal) because the former offered 90 kilometers of smooth water in case of forced landings with full load in the first half hour of flight, the most difficult period.

The 14 planes took off in intense darkness, between 0000 and 0200 G. M. T., January 6, heavy clouds obscuring the full moon and making it impossible to see the sky, horizon, or surface of the water. All altimeters were adjusted to read "0" immediately after clearing the water, as it was impossible to judge from observation of water surface whether the altitude was 5 feet or 50 feet.



Italian Squadron Flight, 1931

According to General Balbo's published account, two accidents occurred during the departure from Bolama. The plane piloted by Captain Recagno, after attaining an altitude of 150 feet, was obliged to land, damaging one of the floats and killing the mechanic, Sergeant Luigi Fois, who was in this float. The two officers and the radioman escaped unhurt. This plane was saved but remained at Bolama.

Another plane, under command of Capt. Luigi Boer, was also forced to land, after only 10 minutes of flight, and upon landing this plane caught fire, probably from a short circuit, according to General Balbo's theory. This plane and its crew of two officers and two men were lost.

For the first six hours the flight was entirely by instrument, the planes being assisted in keeping formation by lights placed above the wings on all planes.

Apparently the formation was very incomplete, even from the start. General Valle's plane, in particular, had great difficulty in getting off the water so that he left one hour and a half after General Balbo. He rejoined, however, before the arrival at Natal.

At 0310 G. M. T., the destroyer *Tarigo* reported "seven planes passed at 0406 (local time), three more at 0447"; the destroyer *Vivaldi* reported "six planes passed at 0606 (local time) three more at 0625." It may thus be seen that the flight was not completely a "flight in massed formation," as had been intended.

Weather reports were sent out to the planes continually by the Brazilian Telegrapho Nacional. This service also kept the Government and the press informed of the progress of the flight.

The weather was unfavorable during practically the entire flight—intense darkness during the night, heavy rains early in the morning, sky overcast with occasional rain throughout the day, and heavy clouds near the Brazilian coast.

General Balbo was in communication at various times during the crossing, with the other planes, the escorting ships, *Bolama*, *Natal*, and even *Rome*.

No navigation by celestial observation could be accomplished, due to the weather conditions. The destroyers were of great assistance in marking the way, and several planes requested and received radio bearings from compass stations on the coast of Brazil when within an hour or two of landing. It is not known whether or not any celestial navigation had even been contemplated. A detailed inspection of one of the planes at Rio de Janeiro disclosed no instruments for this purpose. Of course they may have been removed; though the plane presented the appearance of being in exactly the same condition as when it landed, as other loose articles of equipment and personal belongings were still there.

General Balbo stated in his press interview that he had had doubts about maintaining required speed over the water on account of conflicting meteorological information given him before the flight, but that the desired speed was actually made.

The speed of the planes in formation averaged about 170 kilometers per hour, and the altitude at which most of the flight was performed was about 200 meters.

After nine hours of flight Captain Baistrocchi's plane radioed General Balbo that he had to land and gave his position. Balbo relayed this information to the commander of the destroyer squadron, which sent a ship to tow the plane to the island of Fernando de Noronha, about 400 kilometers from Natal. The plane had landed about 600 kilometers from Fernando de Noronha.

General Balbo stated that he saw only one ship other than the Italian destroyers. This was an English ship, which sent him a radio, asking her position.

At 1345 (Brazilian time, forty-fifth meridian) the first six planes were sighted from Fernando de Noronha; at 1405, three more; and at 1415 the tenth plane passed over the island.

At 1423 Captain Donatelli's plane was forced to land off the rocks, São Paulo and São Pedro. The crew were taken off and this plane was also taken in tow for Fernando de Noronha.

Both Baistrocchi's and Donatelli's forced landings were necessitated by leaky radiators which were caused by excessive propeller vibration. General Balbo said he would never use wooden propellers again for tropical flights as the heavy rainstorms caused them to shred and split, setting up terrific vibrations.

Both of the planes forced down were towed safely to Fernando de Noronha, where the radiators were repaired. Donatelli's plane later flew to Natal, arriving at 1500 on January 8. Baistrocchi also took off for Natal but crashed almost immediately, the plane sinking. He and his crew were saved.

At 1607 on the 6th General Balbo with the first six planes arrived at Natal, having covered the 3,000 kilometers in about 18 hours; the seventh plane arrived at 1635 and the remaining three at 1640.

THE ARRIVAL IN RIO DE JANEIRO

The next two legs of the cruise were negotiated without difficulty, the air squadron and destroyer squadron arriving simultaneously at Rio de Janeiro at 1700 on January 15. The landing in Botafogo Bay was very spectacular, with many members of the provisional president's cabinet, the Italian ambassador, other high officials of the Government, and members of the diplomatic crops, etc., in a pavilion at the boat landing, and thousands of spectators lining the sea walls. President Vargas himself observed the arrival from the palace.

General Balbo is an excellent "showman." Not only was the arrival itself dramatically staged, but in all his public appearances and utterances he executed most efficiently his mission of promoting Italy's prestige. He was greatly aided by Ambassador Cerruti, who in one speech, after stressing the double purpose of the cruise—to show that formation flying across the South Atlantic was feasible and to strengthen the already close tie between Brazil and Italy—spoke of Italy at the mother country, since Rome was the mother of all the Latin races.

DESCRIPTION OF S. 55 TYPE OF SEAPLANE USED

The S–55 seaplanes of the trans-Atlantic cruise from Italy to Brazil belong to the series of standard bombing seaplanes, though modified in this principal installations to give them greater endurance. Some details of design follow:

Wing.—It is a monoplane wing with thick profile gradually tapering toward the wing tips.

The wing is divided into three parts of independent structure and easily dismounted.

The central part of the wing carries, underneath, the two floats, and above, the engine bed.

The pilots' cockpit with its installations, is contained in the thickness of the entering edge of central part of wing and has an arrangement for dual control. The cockpit is protected by a special transparent dome opening at sides and upper part by means of sliding windows.

On the central wing section, under the engine bed and in rear of pilots' seats, there is a water-tight door which shuts off the motorist's compartment.

To the central wing section are attached the two wing planes which have a strong dihedral for transversal automatic stability. The wing tips remain high above the surface of the water, which has the advantage of giving to the machine excellent nautical qualities.

The internal structure of the whole wing consists of three robust wooden spars stretching across the whole wing span and joined together by transverse sections of plywood, so as to constitute in the interior a structure of double cellular casing with maximum resistance to strains.

This double casing thus provides water-tight compartments, which in any eventuality will insure floating of the whole machine.

The wing tips carry the ailerons of welded-steel tubing covered with plywood.

The principal characteristics of the wing are as follows:

Wing span	78.744 feet.
Maximum wing chord	16.7331 feet.
Angle of setting	3°.
Horizontal dihedral	156°.
Vertical dihedral	173°.

On the central wing section is mounted the power-plant structure which carries the two motors in tandem, one tractor and the other pusher.

Its construction and position insure accessibility to motors and facility for changing same.

The triangular system of power-plant structure forms a framework which contributes toward the rigidity of the central wing section.

The oil tanks, main and auxiliary, are placed between the two motors.

Cooling of motors is insured by an ample radiator with distinct circulation system for each motor.

From compartment in central wing section, a special installation permits of refurnishing motor group with oil and water during flight.

Floats.—The hull is composed of two floats, wider than the normal and with concave bottom attached immediately underneath central wing section. They do not reach as far aft as tail planes which are attached to floats by a boom system.

The floats hold 14 gasoline tanks, 7 in each float. The total quantity of gasoline contained in the tanks is 5,420 liters (1,431.96 gallons), thus making it possible for the seaplane to fly more than 3,000 kilometers (1,864 miles).

The interior of floats is accessible throughout; they are illuminated and ventilated.

The framework of the floats is of poplar, walnut, and ash. The joints are of ash and plywood.

The double planks on the bottom are of cedar and plywood. Tarred linen smeared with special antriputrid and impermeable size is interposed between the planks. The basis of this size is liquid pitch and gutta-percha.

The struts at the bottom of floats are of ash and the longitudinal joists are of silver spruce. The double planks of sides and top of floats are of plywood. The prow part of floats is protected by a framework of walnut covered with plywood.

Organs of stability and control.—The tail planes are attached to the floats by means of a boom system. This consists of four spars of silver spruce covered with plywood and linen. They carry at the back extremities—

(1) The horizontal tail plane of poplar, spruce, and plywood with internal steel framework, to which is fixed the elevator of steel tubing, fabric covered.

(2) Two vertical fins and two rudders of welded-steel tubing and plating. The rudder hinges are of steel tubing and plates.

Besides the lateral rudders, the tail carries a third central rudder supported and attached to the other two by framework.

The incidence of the tail plane can be varied by means of a special arrangement.

Power plant.—This consists of two Fiat "A.22 R." motors of 560 horsepower, at 1,950 revolutions per minute—maximum 610 horsepower; 12 cylinders; bore, 135 mm.; stroke, 160 mm.; reduction gear, 1:1.54.

The propellers are two in number—one pusher, 2-bladed, diameter 3.60 m., pitch from 1.90 m. to 2.60 m., and one tractor, 4-bladed, diameter 3.15 m., pitch from 1.90 m. to 2.85 m.

Especial care has been taken in arrangement of radiators and relative shutters, as well as in the arrangement of the gasoline, oil, and water lines

Various installations.—In view of the particular use of this machine, great care has been taken with the navigating installations so as to facilitate anchoring and towing of seaplane.

Considerable care has also been given to the electric and wireless apparatus on board, bearing in mind the possibility of r. t. transmissions, either when machine is in flight or on the water.

This seaplane does not weigh more than 11,000 pounds, and it can take off with a load of 10,560 pounds in not more than 70 seconds. Its maximum velocity is 133 miles per hour, and minimum velocity with load reduced to 5,500 pounds, 68 miles per hour.

Cruising speed, about 102 to 112 miles per hour.

Comment.—It is understood that the principal reason for equipping the S–55 type seaplanes for the trans-Atlantic flight with Fiat "A.22 R." type motors, instead of Isotta Fraschini motors, was because of the fact that the Fiat motor is fitted with a special arrangement of reduction gear which eliminates a great deal of vibration.

SALE OF ITALIAN PLANES TO BRAZIL

It is reliably reported that the 11 seaplanes of General Balbo's squadron have been sold to the Brazilian Ministry of Marine for the use of the naval air service. The price of each plane was 870,000 liras (at present rate of exchange, about $45,000), payable in four semestral payments, beginning on June 30, 1931. The price can be paid either in money or in coffee, at the option of the Brazilian Government.

Four handling trucks and all spare parts located in Natal and Bahia are included in the sale, and one officer aviator, two mechanics, and a rigger will remain with the planes for the period necessary to put them in perfect condition.

PROPOSED TRAINING OF BRAZILIAN AVIATORS IN ITALY

It is also reported that three Brazilian Navy lieutenants and at least as many Brazilian Army officers, all qualified pilots, will soon go to Italy to study aviation with the Italian air force. Unlike former officers studying abroad, it is understood that these officers will not receive "gold pay" (about four and one-half times the "paper pay" received in Brazil), but will receive their extra pay as aviators, and, in addition, the Italian Government is to furnish them with free quarters and subsistence. When this project is considered in conjunction with the sale of the trans-Atlantic flight planes to Brazil, and the detail of one Italian officer and three men to remain with the planes for instructing the Brazilians in their operation and maintenance, it may readily be seen what a profound impression the Balbo flight made upon Brazil, and what an excellent piece of Italian propaganda was consummated.

FOREIGN POLITICAL NOTES

THE PANAMANIAN REVOLT, 1931

For the guidance of army ~~naval~~ officers who might possibly be placed in a similar position at some future time, the following notes bearing upon the recent Panamanian revolt are taken from a report of the American minister to that Republic, and offer an excellent example of how a delicate international situation was ably and successfully handled:

At approximately 3 o'clock on the morning of January 2 I was awakened by a servant who announced that Mr. Jorge Arias wished to see me. Arias rushed into my bedroom and informed me that he had just escaped from the central police station, which had been captured by revolutionists, and that an attack was being made upon the President's palace. The Panama telephone central had been captured by revolutionists, but through the Canal Zone telephone system I succeeded in getting in touch with Acting Governor Schley of the Panama Canal and General Brown, in command of the Panama Canal Department, and requested them to come to my office for a conference. It was understood that General Brown would bring only his personal guard. They arrived about 4 a. m. In the meantime, I could hear continuous firing throughout the city, especially in the vicinity of the palace.

I ascertained that the armed movement was being carried out under the general direction of the "Acción Comunal," an organization which had been formed largely for the purpose of supporting a political program opposed to that of the Government. The members of the "Acción Comunal" come largely from the younger element and include some people of semiradical tendencies. It is not, however, in any way connected with the International Communist movement. So far as I can ascertain, none of the local Communist leaders took part in the armed movement, nor was any one of these leaders active in planning the attack on the Government.

While conferring with Acting Governor Schley and General Brown, several responsible and representative Panamanians who have consistently opposed the political group in control in Panama arrived at the legation, greatly disturbed. While it is possible that some of these men knew that the younger element had been planning

an armed attack on the Government, it appears probable that few, if any of them, knew that the attack was to be carried out at this time. They appeared to fear that those actively engaged in the armed movement would carry it to excess. On the other hand, they did not encourage intervention by armed forces from the Canal Zone. They attempted to induce me to instruct them to get in touch with the leaders of the armed movement and offer some compromise. I took the position that I could not enter into negotiations with the revolutionists, but I took advantage of the opportunity to express the opinion that, if they continued to shed blood, it would be most difficult for any one to treat with them, and that they would certainly defeat the ideals for which they claimed they were fighting. I made my remarks as forceful as possible, in the hope that they would be carried to those leading the armed forces. I have been informed that two or three of the more responsible leaders of the opposition did then get in touch with the revolutionists and that their activities were curtailed. In the meantime, however, they had captured the President's palace, after a pitched battle with the palace guard.

While considering the question of policy to be followed in this emergency, two incidents occurred which tended to complicate the situation—the wounding of an American citizen, Mr. Hartwell F. Ayers, and the request of the Governor of Colon for a train to transport armed police forces from Colon to Panama.

When Ayers was mortally wounded one of the responsible opposition leaders who had been pleading against intervention of armed forces came to me, greatly disturbed, and expressed the belief that the revolution would turn into a riot and counseled armed intervention. I decided, however, not to take action until I could ascertain the conditions under which Ayers was wounded, and soon ascertained that he had entered the zone where fighting was taking place, with a full knowledge of the danger he was incurring.

The request for a train to transport an armed police force also offered complications, because a refusal to grant the request might have been interpreted as indicating that the Government of the United States was supporting the revolutionists. To have granted the request would probably have resulted in a pitched battle along the Canal Zone boundary and directly in front of the Tivoli Hotel. The suggestion that the situation could be met by bringing in American troops was considered and discarded.

After careful consideration it did not appear advisable to call troops or take any action until I could ascertain the conditions existing in the city and at the palace. At daybreak I announced my intention to visit the palace. Some of the more responsible leaders of the opposition wished to accompany me, but I insisted

on making the visit alone. I was not disturbed when I passed through the lines of revolutionists surrounding the building. I was conducted to the President's quarters by the chief of the revolutionists in charge of the palace, which was filled with revolutionists, some carrying dynamite bombs, and some toying with machine guns and other firearms.

I briefly discussed the situation with President Arosemena, who requested armed intervention, but did not insist upon it.

The survey I made of the situation on the trip to the President's palace caused me to reach the definite conclusion that it would be inadvisable to move American troops into Panama for the following reasons:

1. Because I doubted the advisability of injecting the United States into a problem which had to do with political policies in Panama.

2. Because it was apparent that, if American troops should enter Panama, there would have been a bloody skirmish, with considerable loss of life. Bitter feelings would have resulted in the relations between the United States and Panama, which would have lasted for years; and it also appeared probable that such action would be severely criticized at home and abroad.

3. Because it appeared probable that the revolutionists would kill the President and his family and all of their prisoners immediately upon receiving word that American troops were entering the city.

The situation was, however, so serious that it appeared possible that rioting and serious disorder might break out at any minute unless some controlling force could be established. Since it appeared inadvisable to establish and maintain order by means of American troops, the only course left open was to find some responsible authority in Panama which could take the situation in hand. It was evident that I must make some constructive suggestion before it became known that troops would not enter the city.

When I returned to the legation I encountered a member of the supreme court at the door. I requested him to bring the chief justice to the legation immediately. I then conferred with responsible representatives of the opposition party, who I felt could influence leaders of the revolution, with some of the President's friends, and with the presiding judge of the supreme court, and informally and unofficially suggested that the supreme court act extraofficially as a board of mediation to find ways and means of establishing order and in finding a solution of the problem confronting the Panamanian people. I also suggested that it appeared advisable for the firemen's brigade to take over the policing of the city, under the direction of the supreme court, calling attention to the

fact that the supreme court is nonpolitical and that the firemen's organization, which is competent and well trained, is also independent of politics and had no connection with either the Government or the revolutionary movement. I also observed that, in case the above suggestions should be acted upon, it would be advisable for the revolutionists to withdraw from the streets and concentrate at the central police station. I made it clear that these suggestions were informal and unofficial and were made merely as a friend interested in the peace and well-being of Panama. I pointed out most earnestly that this offered Panama an opportunity to settle her own problems and keep her house in order.

When it was suggested that the supreme court might meet at the legation, I insisted that it should meet in its own chambers. When an effort was made to ascertain my opinion as to whether the President should resign and my opinion as to candidates to replace him, I made it perfectly clear that I considered such inquiries inappropriate and that I could not and would not express any opinion about the matter, because I considered it to be the duty of the Panamanians to settle their own affairs.

The program outlined above was carried to completion. Armed men withdrew from the streets and the policing was done by the firemen's brigade. Armed revolutionists were also withdrawn from the Presidencia and the President was guarded by firemen and by a guard of honor of four prominent Panamanians. Members of the supreme court, after several conferences and after a first-hand study of the situation, conferred with President Arosemena. I understand that the members of the court were unanimous in suggesting that the President resign. In any event, he decided to present his resignation. Up to that point the members of the supreme court had been acting in an unofficial capacity.

The cooperation of the members of the supreme court in this matter appeared to be advisable for many reasons. First, it would have been impossible for any commission appointed directly from the active revolutionists and from the Government to reach an agreement, because of bitter feelings; second, it was highly desirable to avoid any suggestion that the legation mediate in the matter; third, the members of the supreme court could act without recognizing the revolutionary movement; fourth, it was also thought that any solution proposed by members of the supreme court would be based upon constitutional and legal principles.

At one time objection developed to the members of the supreme court acting as friendly mediators, on the ground that all members of the court had been appointed during the Chiari and Arosemena administrations, and it was asserted that members of the court would

be prejudiced. When this objection was presented to me I was somewhat disturbed because it was raised by two or three of the more responsible representatives of the opposition group and it appeared that the entire plan might be wrecked. I replied that if Americans and other foreigners had been willing to accept the decision of the Panamanian Supreme Court it would appear that the Panamanians ought to be willing to trust the members of that body. I inquired if they, as representative Panamanians, were willing to indicate by their action in repudiating the court at this time that foreigners had had their cases decided by incompetent and prejudiced judges. Those who came to object against the supreme court, remained to cooperate in the movement.

When President Arosemena indicated a desire to resign, ways and means were discussed (the legation did not participate in any way in these discussions) under which the Government could continue on a constitutional basis, and the following steps were taken in the belief, on the part of the supreme court, that the transfer of authority would come within constitutional provisions:

First: Doctor Ballen resigned as Secretary of Government. President Arosemena accepted his resignation and immediately appointed Dr. Harmodio Arias in his place.

Second: President Arosemena presented his resignation to the supreme court, which accepted it.

Third: Members of the Arosemena cabinet then met and elected Dr. Harmodio Arias as Provisional President.

Fourth: All of the members of the cabinet then resigned except Arias.

Fifth: In the meantime the supreme court had met in formal session and rendered a decision that the election of designados effected on October 1 was unconstitutional, and also rendered a decision to the effect that the designados elected in 1928 continued to be the constitutionally elected designados. The supreme court having accepted the resignation of President Arosemena therefore called Dr. Ricardo Alfaro, elected first designado in 1928, to take charge of the presidency.

Sixth: In the temporary absence of Doctor Alfaro, Dr. Harmodio Arias took the oath as Provisional President before the supreme court.

Apparently the only question raised as to the constitutionality of this change in authorities had to do with the question raised relative to the second and third designados elected in 1928 when Doctor Alfaro was elected first designado. At that time Dr. Carlos Lopez was elected second designado and Mr. Eduardo Chiari was elected third designado. Doctor Lopez at first insisted upon his right to

assume the presidency but later informed the supreme court that he did not desire to assume the presidency and sent the following telegram to Doctor Alfaro:

> Moved by patriotic sentiment, I presented my excuses to the court of taking charge of the presidency during the period of your absence. I trust your Government will answer to the principle of your good name, illustration, and patriotism. If you think it convenient, you may so communicate it to the State Department. Your friend, Carlos L. Lopez, Second Designado.

I have been reliably informed that Mr. Eduardo Chiari resigned as third designado, thus leaving Doctor Alfaro as the only constitutionally elected designado willing to accept the presidency.

Provisional President Harmodio Arias then appointed his cabinet and organized the new government.

The Governor of the Province of Colon refused to recognize the new government and it appeared that complications might arise which would be embarrassing, not only for the new authorities, but also for the legation, because it was entirely possible that those favoring the new régime might attack the governor and his police force. After two days, however, the police force of Colon went over to the new régime and the governor was imprisoned.

One by one the interior Provinces accepted the new régime and at present all have accepted the change and new provincial authorities have been appointed and have taken over control without disorder.

The new government is confronted by many problems. It not only has to face the possibility of a counter revolution on the part of the overthrown government but it is also confronted with the problem of dealing with irresponsible and radical elements within the group which carried out the armed movements against the Arosemena administration. Some of those who took part in the movement feel that the change in administration was due entirely to their efforts and they are dissatisfied because some of the more radical leaders have not been given high positions in the new government. Some elements are also insisting upon bitter reprisals and upon wreaking vengeance upon those who were in any way connected with the previous administration. Provisional President Arias is a man of great ability. He is doing everything in his power to control some of the irresponsible revolutionists.

On account of the attitude of the extremists in the revolutionary party, several politicians connected with the Chiari and Arosemena factions are still held as prisoners. President Arias is, however, making every effort to liberate these prisoners and will, no doubt, do so as soon as he feels he is sufficiently strong to meet the opposition of the overzealous revolutionists.

The spite of the more zealous revolutionists is directed against Rudolfo Chiari, president from 1924 to 1928, and head of the political faction which elected Arosemena to the presidency. During the disorders incident to the revolution, Mr. Francisco Arias, one of the opposition leaders, but a friend of Chiari, took him to the Ecuadorian Legation and requested the minister to grant him asylum, to which the minister acceded. Francisco Arias is Minister for Foreign Affairs in the new cabinet and some of the radical revolutionists resent the protection he gave to Chiari. The feeling against Chiari is so bitter in some quarters that rumors were current that the Ecuadorian Legation would be attacked and Chiari seized. The Ecuadorian minister informed me about the matter and confidentially requested my assistance. I conferred informally with members of the new régime and called their attention to the grave situation which would develop if the immunity of any legation should be violated. Steps were taken to protect the Ecuadorian Legation, and to point out to the overzealous revolutionists the danger that would be incurred if they should carry out their plans.

The armed movement against the Arosemena administration was planned and executed by an organization known as "Accion Comunal," in which a Dr. Ramon Mora is a leading spirit. When this organization was first founded it was my impression that it was connected in some manner with the communist movement. Later investigation, however, leads me to believe that the organization has no connection with the International Organization of Communists and its only interest is in Panama political affairs. While a part of its program appears to be semiradical, its energies have been directed largely against the political faction which has been in control of the Panaman Government for many years.

The activities of Mora came to the attention of authorities in the Canal Zone as early as last October when two enlisted men reported to their superior officers that Mora had attempted to make arrangements with them to manufacture bombs and other explosives. Information about Mora's activities was made available to the Panaman Government by this legation. So far as I could ascertain no action was taken against Mora by the Panaman authorities.

The outbreak of the armed movement at this time came as a surprise not only to the Panamanian Government but to American agencies in the Canal Zone and Panama. While it has been known that there has been considerable discontent with regard to political matters, it was believed that this discontent would not show itself actively for several months. In fact, it appears that the movement on the morning of January 2 came earlier than was originally planned by those who promoted it. It is reported that members of "Acción

Comunal" met on the evening of January 1 to make definite plans for the revolutionary movement to take place some days later. It is asserted that they discovered that their plans were about to be disclosed and they decided to act at once.

While it appears that the new government is slowly dominating the situation there is, of course, always the possibility that disorders will develop. I am using the influence of this legation, in so far as I consider it proper to do so, to encourage calmness, saneness, and seriousness on the part of all elements. The attitude of the United States in declining to intervene in political affairs has thrown upon the Panamanians the responsibility of meeting a situation which they had not anticipated, and considerable time must pass before complete confidence can be established.

In connection with recent developments in Panama, every effort has been made by this legation to avoid complications for the United States Government.

ANGLO-INDIAN ROUND TABLE CONFERENCE

King George opened the conference on November 12, 1930. The British delegation was made up from the three main political parties; the Indian delegation consisted mainly of princes of sovereign States whose independence under British suzerainty are virtually unchallenged and whose loyalty to Great Britain has never been questioned.

At its opening the conference had before it the Simon report. Lord Irwin's memo, and the proposals of the Indian delegation.

The Simon report provided for India's progress toward self-government as a federation of autonomous Provinces, subject to the maintenance of large reserved powers and of control over the army by Britain. This report is voluminous, but the recommendations do not provide for reaching the ultimate goal of Dominion status during any definite period for such strides in the reformation that such a status would come in the near future.

Lord Irwin's plan was more generous to India than the Simon proposals, and though not suggesting a Dominion, made many concessions on internal and imperial affairs, emphasizing the necessity of immediate action toward India's self-government instead of putting the reforms off to some distant future. In his plan he placed first those subjects in which the interest of Parliament might be continuous, such as defense, foreign affairs, preservation of general tranquillity, and the fulfillment of financial obligations. Second,

those in which Parliament might have only an occasional interest, if and when necessary to safeguard her purpose, such as taxes, tariff, and commercial policy and management of railways; and finally those subjects wherein seldom, if ever, would the popular policy come in conflict with the responsibilities of Parliament and would comprise the general economic development, the industrial policy, questions of labor, and general administration, such as education, agriculture, health, etc. The London press criticized this plan, stating it put a damper on India's hopes and made possible an autocratic régime of the Viceroy due to his wide power and Indian control of the army. The Ghandist press rejected the plan, though British Indian papers (British owned) approved.

The Indian proposals of course were for immediate and complete Dominion status with the stipulation that for a limited transitory period the British would retain control of the army.

The first week was taken up in presentation of claims, debate, and discussion by the different factions.

The Indian representatives were united in demanding immediate self-government, which status the British themselves have held as being the eventual goal. They were firm in stating that whatever form of government was to be eventually agreed upon it must be autonomous with the Prime Minister and cabinet responsible to a legislature elected by the Indian people. Contrary to the assumption on the part of the Simon Commission and Lord Irwin (Viceroy of India), the princes joined in the plea for an Indian Dominion and thereby removed one great barrier to a possible agreement and answered the excuse often given for delay in giving India an autonomous government. The princes and others generally agreed that great dangers lay ahead no matter what the conference decided, but failure to do anything would become a catastrophe.

The Conservative and Liberal members of the conference insisted that the Simon report be the "basis of discussion," but took a moderate stand in their pronouncements on India and expressed their willingness to see her given a degree of responsible self-government. Lord Peel (leader of the Conservative delegation) particularly backed the Simon plan and insisted that Dominion status for India must be obtained gradually. Doctor Moonje for the Hindus and Maulana Ali for the Moslems then practically demanded Dominion status and gave warning that if Great Britain followed the policy as laid down by Lord Peel that a revolution, caused by India's extremists, would be inevitable.

At the close of the first week's debate Premier MacDonald gave assurance to the Indian delegates that his Labor government accepted everything that had been said since 1917 in behalf of Great

Britain concerning constitutional reforms in India, including Dominion status, which the Viceroy and other British statesmen have repeatedly declared to be the ultimate goal. He also stressed the fact that the problem of the conference was to supply answers to such questions as to the nature of the component units of the federation, the nature of the central coordinating structure, the relation of this structure to the Provinces, the relation to the States, the necessary provisions to secure willing cooperation of the minorities and special interests in general, the power, functions, and responsibilities of the general structure. The practical answers to these questions could then be embodied in an act of Parliament. He concluded by urging honest, laborious thinking in the work of the committees, that final words be reserved until the closing meetings at which time he hoped they would be able to register an agreement which would enable both of them to go their various ways with friendships strengthened, and the desire to cooperate amplified. Indian delegates looked to Mr. MacDonald and Mr. Benn, Secretary of State for India, as their champions in endeavoring to obtain for India what she wanted.

It was Mr. Montague, when he was head of the Indian Office, who made the famous declaration in the House of Commons in 1917 that "the policy of His Majesty's Government is to increase the association of the Indians in every branch of the administration and bring about the gradual development of self-governing institutions with a view to the progressive realization of responsible government in India as an integral part of the British Empire." That was the war-time promise which has been fulfilled in large measure but which has also led to the present upheaval in India because Mahatma Gandhi and the radicals of the Nationalist Party insist that the time has now come for its complete fulfillment.

Soon after making the declaration Mr. Montague went to India where he worked on the problem for five months. The results of his investigations were embodied in the famous Montague-Chelmsford report, which is the basis of the present law by which India is governed.

The Indian Nationalist movement in its present form dates from the first All-Indian Nationalist Congress which met in 1885, although opposition to British rule burst into flame during the mutiny of 1857. The activities since the World War are those mostly affecting the present problem and center about two disobedience campaigns led by Mahatma Gandhi. The first was from 1919 to 1922, and rose not so much from the inadequacy of the Montague-Chelmsford reforms, as from the sedition act and the Amritsar massacre which led many educated Indians to regard as useless the sacrifices made by India on England's behalf during the war. The

appointment of the Simon Commission in 1927 again set the revolutionary forces in motion as it led the Indians to believe that England was determined to retain strictly in its own hands control over any further measure of constitutional reform that might be granted.

At Lahore in December, 1929, the All-Indian Congress went on record in favor of independence and preparations were made for a second campaign of nonviolent, noncooperation which was inaugurated in March, 1930. The progress of that movement had a direct bearing on the deliberations in London where the stand of the Indian delegates was dictated at least in part by the conditions they are meeting on their return.

At the opening session of the conference Mr. MacDonald was made chairman and as soon as the speech making was over the problem of the conference was to decide to what degree India is to assume responsible self-government.

The agreement of the princes to unite in pleading for Dominion status did much to brighten the prospects of the conference. Strength and unanimity were further added to the whole Indian appeal, and chances of tangible results were considered enhanced by both Indian and British delegates, when the Brahmans and other high-caste Hindu delegates, by throwing aside India's 5,000-year-old caste system, agreed in writing that the "untouchables" should have political equality in proportion to their numbers. The representatives of the untouchables stated that they would rather take their chances in the future with Indian rulers than continue under British Government. A third crumbling of Indian customs was also evidenced when an Indian woman delegate added her testimony on home rule and sat at the council table in London debating political freedom on even terms with the men of India and Britain.

In November 25 an appeal was made to Premier MacDonald by several members of the Indian delegation to release Mahatma Gandhi and 60,000 political prisoners in Indian who have not been guilty of violence, claiming that such a gesture on the part of Great Britain would break down the skepticism existing generally in India and the open opposition on the part of the extremists in the Gandhi party.

The agenda for the conference was announced on November 28, and contained a preamble and 12 subjects, the first being "The component elements of the federation." The possibilities were, theoretically, first a union of all the States on the one hand combining with British India to form a federation; second, a federation of British India and all States, each of the latter coming in singly; and third, a federation of each Province of British India, taken

separately, and each State. The Indians claimed that the agenda was vague and did not once mention Dominion status, but Lord Sankey, head of the Federal Relations Committee, stated his plan did not bar discussion of such a status.

On December 1, Burma gained her long-desired promise of separation from India. Her representatives had refrained from taking part in the discussions relative to an Indian federation for fear of prejudicing their cause. Burma is a Province of British India, having an area of 230,000 square miles with 13,000,000 inhabitants, all of whom are Buddhists. They are free from religious warfare and, with the exception of a few tribes, are homogeneous. The women have never known the purdah and are as free as the men. Illiteracy is much less than in India. The Labor government favored the move and both Earl Peel and the Marquis of Reading, representing the Conservative and Liberal Parties at the conference, voiced their assent, so that the requisite ratification from the British Parliament is expected. The subcommittee of the conference on Burma also decided that partition between India and Burma could be made without financial harm to either country, and that the financial details involved are mostly technical and should be finally decided by an impartial tribunal. It was also decided that the rights of the 800,000 Indians in Burma should be safeguarded, and ample protection should be afforded other minority groups and that future immigration laws of Burma should not discriminate against Indians desiring to enter in the future. The committee asked the British Government to make a public announcement of acceptance in principle of the separation, and also of its assurance that this separation would not prejudice the future constitutional advance toward her future desired status as a Dominion instead of a Crown colony.

The committee in formulating a constitution for India were in virtual accord on a score of matters, many of which they based on American laws. However there were a number of controversial matters, namely, (1) defense of India; (2) external relations; (3) relations between independent States; and (4) political prosecutions.

In this connection Lord Sankey's committee received more details from the princes in which they insisted that first the independent States of the princes be represented in Federal legislature by members chosen by the State governments, and not be mere personal delegates of the princes; secondly, the several States must have the privilege of entering the proposed federation separately, each at its own chosen time; and thirdly, the independent States must retain their present sovereignty except in so far as they voluntarily sur-

render a part of it for the sake of perfecting a Federal organization. The princes would not federate with British India as now organized as a unitary government, but insisted that it too become a federation on its own account, and that the several Provinces of British India must bear the same relation to the central government as the States will bear, and must not be controlled by a central government in one block. The British Indians desired the same thing. However, another step forward was made when the princes agreed to a 2-chamber legislature instead of a single-chambered parliament.

The one greatest divergence of opinion was between the Hindus and Moslems on the communal question, in which the Hindus demanded proportionate representation in the provincial legislatures. This was opposed by the Moslems, who were in the minority. There are in India approximately 220,000,000 Hindus and 70,000,000 Moslems. Mr. McDonald took a personal hand in an endeavor to reconcile the two factions but for a while the negotiations resulted in a deadlock, and for a time it was believed that the British Government would have to resort to the recommendation of the Simon Commission to continue separate electorates if an agreement could not be reached. However, a dispatch protesting against concessions on the part of their delegates at the conference was sent by the Moslems of Bengal, and a conciliatory spirit was lacking among the Moslems on the question of separate electorates and representation proportional to population.

Except for the religious question, the conference moved rapidly toward an agreement between Indian and the Government representatives. Lord Peel, head of the Conservatives, expressed doubt of their ability to approve the proposed constitution when presented to Parliament, and consulted with Mr. Baldwin and others who believed India is not ready for more self-government than they have at present, in the hope of arousing public opinion in advance against the Government's liberal course toward India. Winston Churchill voiced condemnation of the conference and Labor moves toward self-government for India, but his attack did not have much effect at the time, and the Indians, many of whom are schooled in politics, considered Mr. Churchill's declaration as the voice of a small section of the Conservative Party unlikely to influence the present negotiations. The Prime Minister, in ironic language, censured Mr. Churchill and compared him to George III who lost his American colonies. Lord Reading, presiding at a dinner, said in a speech " we are going to arrive at something even though it can be only provisional at this stage; but it must develop in such a way as to give satisfaction to the whole of India in the end," thereby indicating the attitude of the Liberal Party when the cause reaches Parliament.

Two workers in speeches before the subcommittee on franchise urged universal suffrage for all adults, claiming that illiteracy should not bar anyone from voting. A British speaker contended that with such an enormous population the electorate would be too vast to handle and branded the idea as fantastic. The committee, however, agreed that the basis for the franchise should be broadened from the present rate of about 3 per cent to 25 per cent of the population, since the present percentage was not enough on which to build up a system of increased self-government. Doctor Ambedkar, representing the " untouchables," also insisted on a franchise for all men and women over 21 years of age, regardless of other qualifications.

On December 22, the two women delegates made an appeal for equal political rights for their sex, insisting that their safeguards be incorporated at the outset in the new constitution itself, and not left to chance legislation of the future. Under the existing law, the only Indian women having the vote are those qualified as property owners. They not only demanded the vote, but also assurance that a fair number of women should be elected to the Federal and provincial legislatures.

Certain reservations were always considered extremely desirable, but as the Hindu-Moslem deadlock continued with no possibility of breaking it, certain safeguards became essential, one in particular being that of protecting the minorities. Others were the control of defense, finances, foreign and native States' relations, and the tribes.

The autonomy granted India would undoubtedly be covered by a Federal constitution under which the Provinces and independent States would be component parts somewhat like the United States. The self-government proposed would be more lenient than provided for in the Simon Report, and would follow closer toward the position taken by Lord Irwin. The Indian delegates in London assured their acceptance of such a constitution, though British authorities are not blind to the probable flare-ups in India, and hope that nothing worse will happen than in Ireland, and that in the end India will become peaceful and remain a part of the Empire.

Heeding a warning that the Indian people might reject the whole conference plan if delayed too long, the committees sped up the work on the basic law. The Indian delegates favored a Viceroy or Governor General appointed by the Crown, but pleaded for a responsible Indian ministry in all departments excepting Foreign Affairs and Defense. A British Liberal delegate, M. P., declared in a speech, " Before the session close there will be a declaration of British policy. The declaration will open a new chapter in the history of

India and will be one of the cardinal events in the history of the Empire. The control of India has to pass to the Indian people—of that there can be no doubt." Lord Reading pledged the Liberal Party's support to the new constitution in process of construction, and the success in Parliament of enacting legislation seems assured with the uniting of the Laborites and Liberals. Sir Samuel Hoare expressed grave doubts concerning the workability of the constitution, and did not state what the Tory attitude would be in Parliament.

J. H. Thomas, Minister for the Dominions, presiding at the subcommittee on defense, stated on January 9 the British Government had accepted the idea of Indianization of the army in India, and his committee would work out the details. The replacing of British officers by Indians would have to be undertaken with due regard for the safety of the country, and would not necessarily imply that all British officers would be retired eventually from the Indian military service. He advocated the establishment of an officers' training school in India on the lines of Great Britain's school at Sandhurst, but expressed the hope that Indians would continue to come to England for military educations as in the past.

Sir B. Nath Mitra, foremost financial expert of India, said that India has ample gold supply of her own to set up a reserve bank without outside aid. He scouted any debt repudiation, and said that provision for interest and sinking fund will be the first charges against Indian revenue. He further stated India's willingness, in case of a financial dispute with England, to submit the question to the Imperial Tribunal for the settlement of Empire disputes and referred to his country as the Dominion of India.

The chairman of the Federal Structure Committee on January 12 outlined the Indian constitution which was largely patterned after that framed in 1787 for the United States. The similarity was especially evident in the legislative branch, the senators, probably 100, being elected by provincial legislatures, and the lower house, for which no name has been selected, elected by direct vote. There will be a prime minister, and a cabinet of ministers, over which will be a Governor General, the latter appointed by the Crown. The ministry can be overthrown, but instead of by a mere majority, a two-third vote of both houses in joint assembly is necessary. The Governor General is to hold the balance, will control foreign policy, defense, finance, and in a crisis can rule alone. Disputes similar to those which have occurred in the United States are probable, and a clash of Federal and State rights are foreseen.

Earl Peel and Sir Samuel Hoare, Tory members, presented a memorandum to the committee in which they stated dissatisfaction with the proposed constitution as not being adaptable or containing

sufficient safeguards, and expressed the opinion that it will be impossible to introduce the new Indian Government law in Parliament for two years.

Three Hindu leaders proposed that the Hindu-Moslem dispute be settled by arbitration and suggested the names of Mr. MacDonald, Lord Sankey, Mahatma Gandhi, and Professors Murray and Salvador de Madariaga of Oxford, as the arbitrators. It was believed that if Mr. Gandhi would consent to help settle the difficult problem he would then withdraw his opposition to the conference as a whole, and thereby abate the opposition of the whole congress party to the conclusions of the conference. Sir Muhammad Shafi, speaking for the Moslems, said that rather than risk wrecking the conference and its major scheme to give India a constitution, his followers had decided to make further concessions and accept 49 per cent of the seats in the Legislature of Punjab. Unexpectedly, however, the leader of the Sikhs, Sardar Sahib Ujjal Singh, demanded 24 per cent representation when they have but 11 per cent population, upsetting everybody's thought that their troubles were over.

On January 15 the Lord Sankey report, outlining the framework of India's future Federal Government, was adopted in committee, and the next day a resolution proposed by Mr. MacDonald in which he stated the reports of nine subcommittees had been received, was adopted.

A flurry was created in conference circles by a report that the Maharaja of Bikaner had proposed the liberation of all political prisoners in India, a total of about 50,000. The Maharaja is a powerful Indian potentate, and has always been a staunch friend of Great Britain.

At the final meeting of the conference on January 19, Premier MacDonald announced the British Government's policy on India, the chief points of which are as follows:

(1) Amnesty for India's 50,000 political prisoners if "civil order" is restored in India.

(2) An invitation to the Indian extremists to participate in the negotiations still to come before the new Indian Government is established.

(3) Establishment of full responsible self-government in India, with the Imperial British Government reserving control of finance, foreign affairs, and defense.

(4) Extension of the voting franchise in India and lifting of restrictions based on religion and caste.

(5) Establishment of a legislature of two houses modeled along the lines of the Congress of the United States.

(6) Encouragement of Indians to settle their own communal problems.

(7) Uninterrupted continuance of negotiations to settle the details of the new government.

Immediately after the announcement of the British Government policy on India, newspapers in India clamored for the release of Gandhi and the thousands of political prisoners, insisting that the delegates returning from London can not get a proper hearing on the results of the conference nor will any constitutional scheme receive cooperation and active support of the great congress organization so long as those people are in prison.

Gandhi and many of his aides were released on January 26 and proceeded to Bombay. He stated at the time that he had no policy mapped out and no ill feelings but was waiting to discuss the situation with his friends.

In an interview on January 27, Mahatma Gandhi stated that the civil disobedience campaign will continue uninterrupted not for the purpose of registering resistance to the Government but as a protest against abuses which the India Congress Party is determined shall cease. The abuses mentioned are the use of intoxicating liquors, the use of foreign cloth, and the repression of the " national right " of the people in India to make their own salt.

Out of the respect to the returning round table delegates the All-India Nationalist Congress Committee had delayed formally publishing a resolution to the effect that the civil disobedience movement must continue, but due to an impression rapidly spreading throughout India that civil disobedience had been suspended, the resolution was promulgated on February 2. Business men in India are earnestly endeavoring to bring about an early settlement of differences in the interest of trade.

The attitude of the House of Commons toward the work of the conference was shown on January 26 when Mr. MacDonald received the support of the leaders of both opposition parties. Tribute to the accomplishments at the conference were paid by many, Mr. Churchill alone criticizing the results, his action being repudiated by Mr. Baldwin.

Since the Conservative Party has approved the work of the conference the prospects for the adoption of a new constitution for India depends not so much on Parliament as upon how quickly the Indian people themselves are able to iron out their own local differences, and on what part Mr. Gandhi and his Congress Party are to play in the negotiations.

An agreement reached late March 3, between the British Government of India and Mahatma Gandhi contained the following principal concessions: Permission to manufacture salt by natives on sea coasts, the Government to maintain control of its manufacture and

distribution in inland areas; Gandhi will no longer press his demands for an inquiry into police excesses, and will end the civil disobedience campaign.

Immediately after signing the agreement with the Viceroy, Gandhi begain taking steps to end the civil disobedience campaign. The most vital question in connection with the negotiations is to what extent Gandhi's word will bind the Congress Party as a whole. Gandhi, though accepting the agreement and admitting that it gave much to the Nationalists, again served notice to Great Britain that India's ultimate goal is complete independence.

The Secretary of State for India read the terms of the agreement to the House of Commons on March 5. Though a battle with the Conservatives is probable, approval of the terms of the settlement by the House is expected.

On March 6 the Viceroy lifted ordinances dealing with illegal assemblies, publication of news sheets, and picketing. Also an order ending civil strife was promulgated. Civil disobedience prisoners are being released, it being expected that several days will be required to accomplish the task. Gandhi defined the meaning of "Swaraj" as used in their demands as meaning "self rule from within" but not separation from Britain.

Gandhi returned in triumph on March 9 to Ahmedabad whence a year ago he started his civil disobedience campaign and vowing he would never return until his country's independence had been achieved. He returned with a truce which freed his followers, ended civil strife, and pledged his party to work for self-government in cooperation with the British. Almost fanatical acclamation was accorded him on every hand.

A few days later the die-hards of the Conservative Party, headed by Mr. Churchill and Lord Beaverbrook, repudiated the Government's policy on constitutional reform and stated that the Conservatives would not take part in future conferences. This action did much to cause unrest and uncertainty in India but Mr. Baldwin immediately denounced this attitude in his party and declared his own loyalty to the Indian cause.

On March 16 in India, the princes gathered to discuss among themselves details of a proposed federation for all India. There is a wide difference of opinion among them, Gandhi showing a peaceful attitude while Pandit Nehru pleads for a fighting spirit and demands a complete independence in internal affairs and Pandit Patel urges the burning of all foreign cloth.

The ultimate success of negotiations depends largely on Gandhi's power to control his party and it is the hope of the British that he

will personally be present in the delegation which, joined by National Congress members, will meet in London shortly to continue the discussions of the new constitution for India.

THE PALESTINE MANDATE

Twelve years ago the Ottoman Empire lost control of Palestine after ruling it for 400 years. For 1,300 years the land has actually been in possession of the Arab, and, while there was no love between them, the Turks wisely refrained from disturbing Arab culture and customs. There have always been a few of the original tribes of Israel holding land in Palestine but in the latter part of the last century, through the assistance of Baron Rothschild, the Jews began a systematic return, which caused no particular friction with the Arab. With certain restrictions the Jew was permitted freedom to visit and worship at the Wailing Wall. By the close of the World War 60,000 Jews were living peaceably among 550,000 Arabs.

During the World War British troops were confronted by a difficult situation due to the strategic position of the Turks in Mesopotamia, Syria, and Arabia. Sir Henry MacMahon, High Commissioner of Egypt, in 1915, after correspondence with Chief Hussein, secured timely and valuable assistance of the Arab forces. The Arabs claim that among the inducements offered was the establishment of an Arab State to include practically all of the territory between Persia and the Mediterranean. The British deny that Palestine was ever intended to be a part of the Arab State. In 1916 the French and British in the Sykes-Picot agreement provided for the division of the land bridge between Persia and the Mediterranean. Palestine with the holy places was to be subjected to a special régime to be determined by agreement between Russia, France, and England. On November 2, 1917, the Balfour declaration, which dominated the situation in Palestine, took its form from a letter to Lord Rothschild, and stated that the British Government viewed with favor the establishment in Palestine of a national home for the Jewish people, and would aid this achievement with the understanding that the civil and religious rights of existing non-Jewish communities would not be prejudiced. In 1918 the French and Italian Governments gave assent. Just prior to the armistice the British and French Governments issued a joint resolution indorsing complete and final enfranchisement of the peoples so long oppressed by the Turks and the establishment of national governments and administration. Thus there was set on foot the intense hatreds which to-day cause such grave concern to the governing authority.

On April 24, 1920, the Supreme Allied Council at San Remo awarded the mandate for Palestine and Iraq to Great Britain, and, on July 1 following, the military administration of Palestine was converted to a civil one under Sir Herbert Samuel, a Jew. Under the provisions of the mandate the Jews are given special consideration. The mandatory is responsible " for placing the country under such political, administrative, and economic conditions as will secure the establishment of the Jewish National Home," and for safeguarding the civil and religious rights of all the inhabitants irrespective of race or religion; an appropriate Jewish agency was recognized as a public body to advise and cooperate with the administration of Palestine in such economic, social, and other matters as may effect the establishment of the Jewish National Home, and, subject to the control of the Government, to assist and take part in the development of the country; the administration is to facilitate Jewish immigration and encourage close settlement by Jews on the land, including state lands; and Hebrew is made one of the three official languages. The Arabs together with a delegation of Christians, mostly Arabs, bitterly fought the inclusion of the Balfour declaration in the mandate.

Sir Herbert Samuel endeavored to carry out the mandate and in 1922 announced the creation of a legislative council to consist of 10 official members and 12 elective members, the majority to be Arabs. The Arabs boycotted the election and contended for full parliamentary government. In 1923 the election was suspended and the country has been ruled by the High Commissioner, acting with a small advising council.

In 1920 serious riots broke out in Jerusalem, followed in 1921 by bloody riots in Jaffa and vicinity, taking the form of attacks on Jews. These were quelled by British force. Beginning in 1922 Jewish immigration increased, so that 1925 saw 33,000 enter Palestine, causing an economic depression, resulting in much unemployment. After that immigration fell off, though the population has increased; at present there are about 700,000 Arabs, 150,000 Jews, and 80,000 Christians.

The British later reduced the military force until in 1929 there remained actually only a police force. In August, 1929, a local parade caused intense strain resulting in widespread attacks of Arabs on Jews. Since August Palestine has been a smoldering volcano, peace being kept by the presence of British battalions.

The factors responsible for the situation appear to be the terms of the mandate in reference to the Jewish National Home; the actions of a certain part of the Jewish people definitely contending for a Jewish State; the financial backing of the Jews which is gradually

buying up the suitable farm lands; the rapidly increasing Jewish population; and the constant religious friction at the Wailing Wall (Moslem property). Generally, the Christian and former Jewish communities favor the Arab in the matter and the difficulty does not seem to be basically one of religion.

The religious factor offers an opportunity for both factions to give vent to their real grievances, the basis of which are political and economic.

A recent Arab delegation to London expressed demands as follows:

The Balfour declaration can not be carried out.

Immigration to Palestine should be stopped.

Lands in Arab possession should be made legally inalienable, owing to the scarcity of lands in their possession.

There should be established in Palestine a democratic government in which all inhabitants will participate in proportion to their numbers.

On the other hand the Jews feel that the mandate is plain in its purpose to give the Jew a special position and stands squarely on the National Home idea, measuring to his own advantage or disadvantage every Government act from the Zionist viewpoint; they claim that the Government is not aiding them as it should, and that the millions spent by the Jew is bound to help all Palestine; they protest against curtailment if immigration, claiming that the country will support a population three times that at present. The Jew assails the Government for lack of protection to life and property at the time of the riots of August, 1929. The Revisionists, so called, are outspoken in demand for a Jewish State. Also the Sixteenth Zionist Congress at Zurich, August, 1929, demanded "the rightful share of the Jewish agency" to find "full and undiminished expression in the conduct of the administration," and protested the restrictions placed on the distribution of certificates for immigration, claiming that the Jews alone have the right to dispose of the certificates granted by the Government. The declarations are at variance with the announced Government policy, and in accordance with the mandate, the Zionist organization is recognized as the Jewish agency to be set up and is purely advisory

Between these conflicting claims and emotions stand the British Government. It is impossible to state just what the British intentions were at the time of the Balfour declaration, but due to Jewish financial aid to the allies, and the generally accepted aims of the Zionist organization, it could be surmised that the 1917 intent was more on the side of the Jew than it now appears.

Sir Herbert Samuel soon saw the difficulty and asked for a statement of policy. In 1922 the Government adhered to statement of

the mandate, but expressly stated that no promise had been made to establish a Jewish State but that a Jewish home was the intent, and pointed out that the Zionist Commission in Palestine, recognized as the Jewish agency mentioned in the mandate, has and could have no share in the Government. It stated the immigration must be restricted, undesirables would not be admitted, and that the development of self-government was the goal.

After the 1929 riots Sir Walter Shaw was sent to inquire into their cause and make recommendations as to means to prevent a recurrence. The report was a shock to the Jews and many British, and among other things recommended that a clear statement of policy regarding the rights of non-Jewish communities, of land and immigration to be made; that the non-Jewish interests be consulted on immigration; that a scientific investigation be made on cultivation possibilities and that steps be taken to prevent eviction of Arab cultivators; and that a commission be appointed to determine the question of the Wailing Wall. The Government announced that it would continue to administer in strict accordance with the mandate and suspended immigration pending the report of Sir J. Hope Simpson who was sent to Palestine to study the subjects of development, land, and immigration. The League of Nations appointed a commission of non-British composition nominated by Great Britain, to recommend a settlement of the Wailing Wall problem. The work of this commission has not yet been completed. Also the present troops are to be maintained and an expert is investigating the Palestine police force.

On October 20, 1930, the Colonial Office of the British Government issued the Sir John Hope Simpson report together with a White Paper setting forth the Government's future policy in the administration of its mandate of that country.

The Simpson report covered three vital questions of land settlement, immigration, and development. It stated that the arable land already available was limited in extent, that the Arabs were not receiving sufficient consideration in its allocation, and that Jewish immigration should be better regulated and in certain categories checked altogether until more lands were developed for settlement, and until better provision had been made for landless Arabs.

Lord Passfield, Secretary for the Colonies, rests the Government's case entirely on the terms of the mandate, under which the British are administering affairs in Palestine, and which stipulates that such administration must be equally just, fair, and considerate of all the inhabitants of that country, regardless of race or religion. The Arabs are criticized for their lack of cooperation in schemes to promote institutions of self-government in the past and they are warned against religious persecution.

The World Zionist organization is given praise for what has been accomplished and for its devotion to the establishment of the Jewish National Home in Palestine. Concerning the present and future distribution of land the Government says that with the present methods of Arab cultivation there remains no margin of land for new immigration with the exception of undeveloped land that the Jewish organizations hold in reserve. Future settlement depends on increasing productivity of the land already occupied. In answer to criticism that state land has been turned over to the Jews, Lord Passfield declared that unoccupied land in possession of the Government is negligible, and even this small area is occupied by the Arabs and must not be taken away from them.

With regard to further Jewish immigration, Lord Passfield cites the Palestine mandate which " directs that the rights and position of other sections of the population shall not be prejudiced by Jewish immigration " and says " Clearly, if the immigration of Jews results in the prevention of Arabs obtaining work necessary for their maintenance or if Jewish unemployment unfavorably affects the general labor position, it is the duty of the mandatory power to reduce or, if necessary, to suspend such immigration until the unemployed portion obtains work. Under the present circumstances His Majesty's Government considers the suspension of immigration under the labor schedule of last May fully justified."

The attitude of the Jews is prohibiting the employment of Arab labor is criticized as an infringement of the sole right of the mandatory power to determine matters of policy relating to employment, immigration, and land development.

The present British Government is now of the opinion that the time has come to set up a new form of government which, as outlined by Lord Passfield, will consist of a high commissioner with a legislative council of 22 members, of whom 10 will be official and 12 unofficial; the unofficial to be chosen by primary and secondary elections. If a community fails to participate and elect its member, the high commissioner will make the appointment. The legislative council will contain both Jews and Moslems. The commission will retain the power to insure that the mandatory power will carry out its obligations to the league and to maintain order.

The Government gives warning that " all posible steps will be taken to circumvent any attempt which may be made to prevent the establishment and operation of such a government," and concludes the statement with an appeal to both the Jews and the Arabs to cooperate with each other.

The British Government's pronouncement in the White Paper was an outstanding political event causing comment and denunciation by prominent people in different parts of the world. Leading officials

of Jewish organizations turned in their resignations and political leaders in Great Britain went to the defense of the Zionists.

On November 5 the Colonial Secretary made a detailed defense of the Government's policy stating that the terms of the White Paper had been misconstrued and denying that the nine official categories of settlers were barred, or that it was impossible to make unoccupied areas available for Jewish settlement. He also attempted to explode the belief that the White Paper ordered a Jewish agency to cease employing Jewish labor and denied that the Arabs got preference.

Again on November 17 the policy was defended by Mr. MacDonald in the House of Commons when he stated that Palestine will remain a national home for the Jews and that the mandate will be scrupulously carried out.

Continual pressure was brought to bear from all parts of the world to bring about an annulment of the White Paper while, at the same time, Arab interests endeavored to hold the advantage they thought they had gained by it.

Mr. MacDonald's letter to Doctor Weizmann, president of the Zionist Executive Council, was laid before the House of Commons on February 14. It contained generous concessions to the Jews among which are the restoration of the old principle of "immigration according to the absorptive capacity of the country"; the establishment of the "right of the Jews to a share of employment on public and municipal work commensurate with the Jewish contribution to public revenues" and the removal of the restrictions on land purchases. For the time being the differences between the Government and the Jews appear to be settled satisfactorily, though they are criticized by the Arabs. An Arab newspaper calls for a united front against moves to Europeanize the East which the Moslems claim is resulting from existing policies.

NAVAL INTELLIGENCE

Among all the lessons taught by the World War there are few that stand out in such dramatic clarity as those taught in military and naval " intelligence." The subject itself is as old as history, and the importance of accurate and timely information to guide conduct and action has always been recognized, but it required the actual experience of modern warfare—too often illustrated by blunders of appalling costliness in life and treasure—to bring home a realization that the great strides made by science and invention in development of weapons and in the means of communication had revolutionized the methods of obtaining, evaluating, and disseminating information; had multiplied in geometric ratio the complexities of those methods; and, at the same time, had accentuated to a startling degree the essential, one might almost say paramount, value of " intelligence " in planning and carrying out military and naval operations.

While this is all true of army intelligence in its relations to campaigns on land, it should be pointed out that it applies with even greater force to navies engaged in campaigns at sea. The principles are the same in both cases but the conditions surrounding them are quite different. Navies have a much greater mobility than armies. The speed and concentrated power of modern fleets, the size and extent of the ocean areas in which they move, the uncertainties of wind, sea, and weather, all combine to increase the possibilities and to magnify the consequences of strategic and tactical " surprise." These circumstances tend to enhance the value of " intelligence " and also to increase the difficulties of getting it in proper shape and " on time " to the commanders of forces afloat.

NAVAL INFORMATION POLICY

Intelligence is information evaluated and in its broad sense enters into all forms of naval activities ashore and afloat. The principles governing information in the Navy are written in the official paper on " policy," approved and promulgated by the Secretary of the Navy. They read as follows:

1. To emphasize the importance of thorough indoctrination to give proper effect to information in the exercise of command.
2. To recognize that sound decisions and action proceed only from accurate information rapidly communicated.

3. To recognize the importance of the psychological effect of information on morale.

4. To acquire accurate information pertaining to the political, military, naval, economic, and industrial policies of our own and foreign countries.

5. To select, analyze, arrange, classify, summarize, and make available all information acquired for the purpose of reference and dissemination.

6. To disseminate appropriate information systematically throughout the naval service.

7. To acquire and disseminate appropriate information of the enemy in time of war.

8. To link up information so closely with communication and operations that in time of war intelligent, continuous, coordinated, and efficient effort will result.

9. To provide for protection against foreign espionage and propaganda.

10. To preserve for ready reference and for historical purposes, information collected and arranged systematically.

11. To issue analytical studies of important historical incidents with a view to indoctrination.

12. To recognize the great educational value of receiving and imparting information bearing on naval matters through the various appropriate public and private institutions of our country.

13. To cooperate closely with other departments of the Government in the collection, preservation, and dissemination of information.

14. To furnish the public with full information of the Navy not incompatible with military secrecy, including its activities at home and abroad, its educational features, and its contributions to science and industry.

ORGANIZATION OF O. N. I.

From " policy " set forth in the above principles the intelligence service derives its missions and its tasks.

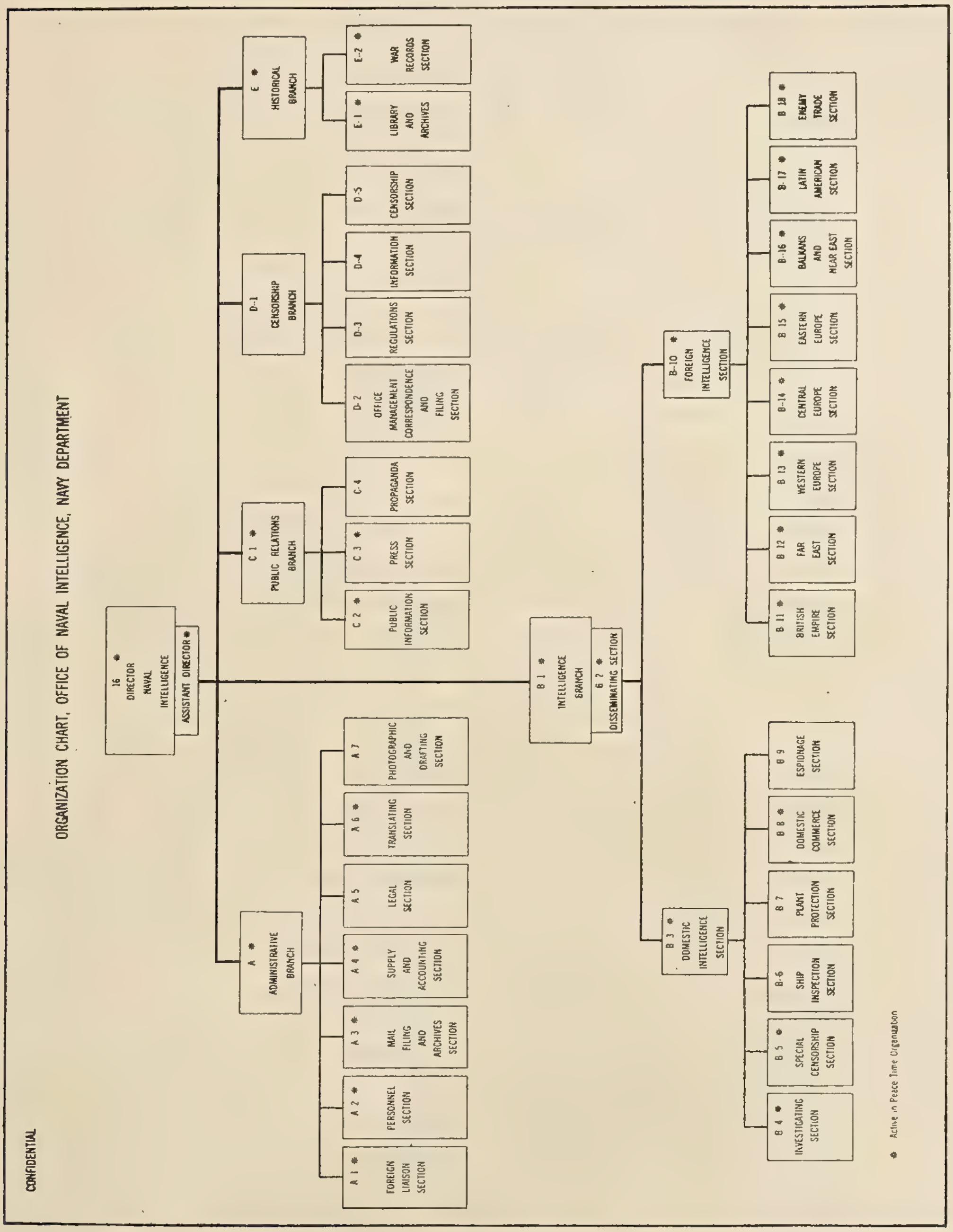
The division of naval intelligence in the Navy Department is commonly known as O. N. I., or Office of Naval Intelligence. The war organization plan of this central or home office is shown on the chart.

For administrative purposes the office is divided into five branches, as follows: (A) administration, (B) intelligence, (C) public relations, (D) censorship, (E) naval records and library. Each of these branches is subdivided into sections.

In peace times this organization is skeletonized; only the activities marked with a star are active, and in many cases the work of several sections is combined under one desk. The nucleus officer personnel complement consists of the director and assistant director, 1 officer for the administrative branch, 3 officers in the public relations branch, 3 officers in the historical branch, and 6 officers in the intelligence branch. The censorship branch is inactive, although special

censoring is provided for under domestic intelligence. The total officer personnel allowed is 15.

Outside the Navy Department there are 18 naval attachés accredited to foreign countries. There is also one intelligence officer assigned to each naval district.



Office of Naval Intelligence Organization

The fleet organizes its own intelligence service afloat, which cooperates with the shore offices.

The above comprises our organized peace-time intelligence service and a general idea of the work being carried on is indicated by the captions on the chart.

In the event of war the plan calls for immediate expansion. Inactive sections would become active and the others would be reinforced. In the central office in the Navy Department the officer personnel would be at once increased from 15 to 137, and there would be a corresponding increase in the clerical assistance. The number of naval attachés abroad would be doubled.

In the transition from peace to war there is perhaps no activity in the Navy that would be called upon to undergo such sudden expansion of effort and such drastic shaking to life with attending modifications of methods to fit the particular emergency, as would be required of the naval intelligence service. One of the most important peace-time functions of the nucleus personnel is to plan for this transition in order that it may be made as smooth and efficient as possible.

The war plans provide that commandants of naval districts, naval governors of island possessions, and commanding officers of naval activities along the Potomac and Severn Rivers, etc., will under cognizance of the Chief of Naval Operations (director of naval intelligence). operate intelligence services in their respective commands.

Their mission will be:

To provide and operate a naval intelligence service within the land and sea areas of their commands for the prosecution of the war.

The *Censorship Branch* comes into existence when national censorship is put into effect, and the Director of Naval Intelligence, in addition to his other duties, becomes chief cable and radio censor. This branch has charge of national censorship of radio and cables in the United States, its Territories and island possessions, and naval censorship throughout the Naval Establishment.

The extent to which the intelligence service would ultimately expand would have to depend upon the nature and duration of the emergency. In the World War in censorship alone in one naval district, that of New York, there were engaged approximately 750 officers and clerks.

No attempt will be made to discuss in detail censorship and other related activities, including the public press, historical records, investigations, ship inspection, plant protection, espionage and propaganda, all of which in one way or another come under the cognizance of the Office of Naval Intelligence, and involve close cooperation with other Government departments. A brief outline of the other activities follow:

The *Intelligence Branch* is the center to which information flows from all the other branches, the naval districts, the fleet, and naval attachés abroad. This branch in time of war would use the resources of the entire intelligence service for obtaining information. Its primary duty would be to evaluate the information received and to provide at all times through the disseminating section to the

operating forces and the shore establishments, information as to the enemy strength, disposition, probable intentions, and his orders and shipments of munitions of war.

In peace time it is the function of the intelligence branch to prepare and send out to the service naval information in the form of publications such as the *O. N. I. Information Bulletin*, and the printed comparative strength tables of the five leading navies, or in the form of special pamphlets, estimates, and studies with a more limited distribution. Also it is a duty of this branch to prepare data sheets for making comparisons of budgets, personnel, building programs, alterations, naval bases, trade routes, merchant marines, etc., as may be required by the President, Congress, the Secretary of the Navy, the General Board, and other high authorities.

The *Domestic Intelligence Section* is now engaged in the preparation of a monograph covering the overseas commercial interests of the United States including trade and shipping. The purpose of this is to present in concise form the trade and economic interests at home, at sea, and abroad that our Navy would be called upon to protect in time of war.

The *Foreign Intelligence Sections* receive from naval attachés, intelligence officers afloat, and other sources, reports on all subjects pertaining to foreign countries. These reports are evaluated and classified. Copies are at once routed to the bureau, office, or commanding officer concerned. Many of these reports have only a special or technical interest. These are filed in the archives for future reference, and copies are sent only to the particular bureau or office that has cognizance.

Another and more important class of information comprises that of political, strategic, or tactical significance useful as the groundwork upon which war plans and naval operating plans would be made. This class of information is given special attention and is placed in so-called naval monographs which are kept for all countries with sea power.

The purpose of these monographs is to have in convenient form, indexed and up to date, essential priority naval, political, and economic information in regard to possible enemies or allies. So that, if war were imminent, copies of the monographs of the countries concerned could be promptly placed in the hands of our commanding officers afloat to help them in making their operating plans to overthrow enemy naval power, to throttle his trade, to blockade his ports and to conduct combined Army and Navy expeditions to invade his shores. These monographs must be prepared in peace time, and if they are to be of maximum usefulness in war it is necessary that everyone in the naval service should take advantage of any opportunity that may arise to collect and send in to O. N. I. any infor-

mation that might prove of value. In this sense the entire Navy is part of the intelligence service. As it is quite impossible to predict the direction of national policies and the various possible alliances and counter alliances that may develop in future wars, any port visited must be considered in the light of a possible area of future operations and information discreetly and judiciously obtained. A single clear and complete report on what is considered a relatively unimportant seaport might well result in the saving of many lives and guarantee the success of an operation.

COMBAT INTELLIGENCE

There is one feature of naval intelligence, and a most important one, which so far has only been touched upon lightly. This is "combat intelligence."

Under the general subject of "intelligence" there has been brought such a wide range of activities covering a field so broad and complex in its various aspects that oftentimes there is grave danger that we will not be able to see the forest for the trees. This is too often the case in regard to "combat intelligence" because it is vital only in time of war. In peace time it is so easy to allow it to be crowded out of sight under the urge of a harassing routine that is always pressing for immediate attention. This is a reason the more why we should strive to give it the primary attention it rightfully deserves.

This type of intelligence, as conceived by the Office of Naval Intelligence, comprises information which, in time of national emergency, is obtained by the operating forces afloat on the composition, movements, and disposition of enemy forces; by naval attachés or agents in neutral or enemy countries on the mobilization movements and probable intentions of the enemy at the beginning and during the progress of the war; by naval districts and other agencies, usually outside the operating area, on composition, movements, and probable intentions of enemy forces wherever located. This office is desirous of developing ways and means for supplying this combat information to the commanders of forces afloat during war time when received from sources other than the forces in the operating area. Correspondence has been exchanged informally with the Chief of Staff, United States Fleet, in an endeavor to bring this subject before the naval forces afloat for comment and suggestion.

During the recent war game in Pacific Central American waters, with the approval of the Chief of Naval Operations and commander in chief, arrangements were made by which merchant vessels passing through the area of probable "Black" operations were to report in special radio cipher all men-of-war sighted. By participation of the main intelligence center in Washington and subsidiary intelligence centers in the districts, a preliminary step was

made toward developing methods and machinery for receiving, digesting, and evaluating information from all sources in order that useful intelligence may be furnished promptly to the Chief of Naval Operations and the commanders of forces engaged in war operations afloat.

WORLD WAR EXAMPLES

It is worth while to examine briefly a few lessons in "combat intelligence" taught by the World War. There was some splendid intelligence work done, especially by the British Navy after their service really got going, but we learn more from mistakes, so we shall dwell particularly on the latter.

In the opening days of the war, after an eventful cruise in the Mediterranean, the German battle cruiser *Goeben* and the light cruiser *Breslau* eluded vastly superior forces and escaped to Turkish waters. The episode is crowded with failures and blunders of omission and commission in the allied information service. For instance, on the eve of Great Britain's entry in the war the German cruiser entered, refueled, departed from, and returned to the neutral port of Messina without the British commander in chief knowing that they had been there at all. If this one piece of intelligence, which was almost common knowledge in a neutral country, had been transmitted promptly to the British admiral conducting operations in those waters, it is reasonable to believe that it would have resulted in a disposition of force that would have made the escape of the German cruisers extremely unlikely.

Another piece of available information that was of primary importance to the British commander, and which he did not get promptly, was the imminence of and final declaration of neutrality by Italy. Although this was known in London, the intelligence service was so clogged and inadequate that it was not transmitted to the commanding officer afloat until too late to be of any assistance to him. Here again, had he received this information promptly, he would have been relieved of the restrictions that required him to watch Italy and keep his ships out of the Straits of Messina, and he would have been able to change his plans in such a way as to have made the interception of the enemy almost certain. These are only two examples of many that could be cited, but when one considers how the escape of the *Goeben* and *Breslau* influenced future events, and the subsequent part that these two ships took in influencing Turkey to enter the war on the side of Germany; and later, in the successful Turkish defense of the Dardanelles, one can not fail to be impressed with the value of a smooth working "combat intelligence" service organized and functioning when war clouds gather.

Turning now to the Battle of Jutland, we find plenty of examples teaching the need and value of an effective "combat intelligence"

service. These illustrations are supplied from both the British and the German viewpoints.

In the opening contact between the battle cruiser squadrons, the German force, commanded by Hipper, caught the British force, commanded by Beatty, divided; and an opportunity to concentrate on two British battle cruisers was lost because the German "combat intelligence" service failed to present a true picture of the situation to Hipper. Instead of engaging at once, Hipper turned away and gave the British a chance to concentrate before the battle started.

It was the German plan to cut off and engage with superior forces a fraction of the enemy. As Beatty and Hipper carried the battle to the south, the opportunity presented itself just before Beatty's contact with the German battle fleet commanded by Scheer. But again the German "combat intelligence" service failed to transmit and to use valuable information that should have been available, and as a result Scheer got a wrong impression of the situation. He thought Hipper was being hard pressed and he hastened to his support. At the last minute he abandoned his original plan. Instead of carrying out an enveloping maneuver as planned, Sheer turned straight toward Beatty and a touch-and-run encounter developed with all forces racing to the northward.

At this phase apparently there was being prepared for the Germans one of the greatest, if not the greatest, tactical surprise in history. Jellicoe was rapidly approaching on an opposite course with overpowering battleship strength, arranged in a formation designed for just this opportunity, to crash suddenly the full British power on the unprepared and unsuspecting van of the long drawn-out German column. Jellicoe was ready and anxious to deliver this opening blow with all the force that could be brought to bear. Could this have been done as planned, it is reasonable to believe that a decisive British victory would have resulted.

But, at the critical moment, things did not happen at all in accordance with plan. Instead of meeting the enemy ahead to the southeast, as Jellicoe expected, the German Fleet suddenly appeared 12 miles to the west of the estimated position and considerably nearer. This new information was obtained too late for Jellicoe to change course and formation for a proper surprise deployment; as a matter of fact, the opposing fleets were actually in battle contact before Jellicoe was apprised of the true situation. Under the circumstances Jellicoe then did the best he could; there is little to be criticised in the tactics he used; but it had to be an unsatisfactory deployment carried out in an unsatisfactory manner; the great surprise opportunity was lost.

Why was the opportunity missed? The answer is because of a deficient "combat intelligence" service. And for professional men, this is, perhaps, the most important lesson taught by Jutland.

Long before the Battle of Jutland the principle of information and its essential bearing on naval tactics was well understood. It was a trite saying: "Information is the groundwork of plans; accuracy is vital; the most accurate information is of no value if not received in time; accurate, timely information bestows the power of initiative and surprise, and these, properly used, may be decisive factors." And yet, when put to the test at Jutland the British information service failed, at the most important stage, to accomplish its mission.

The information service is the vital element of "fleet control"; what angle indicating, range finding, and spotting is to fire control, the "combat intelligence" service is to "fleet control." Moreover, just as "fire control" requires a highly developed system to plot, carry on, and project into the future, bearings, ranges, and spots, so does the "combat intelligence" service for "fleet control" require a similar system with trained personnel to plot, carry on, and project into the future all information received.

The combination of circumstances that gave rise to the unsatisfactory British deployment and consequent loss of a great surprise opportunity may be briefly summarized: Discrepancies in navigation; absence of linking-up vessels; ambiguous signals and errors in transmission; failure on part of advance light forces to maintain continuous flow of information to commander in chief; light forces in battle fleet screen not sufficiently advanced to give contact information in time for commander in chief to improve approach formation; and lack of an adequate "combat intelligence" service with a "fleet control" plotting system to serve the commander in chief.

That errors in navigational reckoning should have arisen is not surprising. The weather conditions were not favorable for astronomical observations, and the advance forces had done considerable maneuvering in battle; that the navigation errors of Jellicoe and Beatty should have been cumulative was unfortunate. In this connection, the excellent intelligence service performed by the British direction-finding radio stations on shore is to be noted. The radio signals made by the German ships were promptly "cut in" and reported to the Admiralty. The latter then sent the commander in chief information based on them. At 5.00 Jellicoe was informed: "At 4.09 enemy battle fleet lat. 56° 27′ N., long. 6° 18′ E., course NW., speed 15 knots." This position was exact within 4 miles. Again, at 5.53, another Admiralty message was received that gave the position of the German Fleet at 4.30, accurate within 3 miles. These messages, however, supplied no correction to the navigational errors made by Jellicoe and Beatty. Had the direction-finding stations also "cut in" and reported the positions of their flagships, the *Iron Duke* and

Lion, discrepancies in reckoning might have been discovered and corrected in time to have permitted the necessary alterations in the battle fleet approach formation.

In the stress of battle, that some ambiguous messages should have been sent and errors made in transmission, was to have been expected; that mistakes of this nature made on the day of Jutland caused confusion at critical moments directs attention to the importance of systematic training in this department of "combat intelligence" for "fleet control."

On the other hand, it must be admitted that there was a good deal of information of sorts available on board Admiral Jellicoe's flagship, the *Iron Duke*. If all the signals regarding enemy contacts, positions, speeds, and formations, are taken from the beginning as they were received on board the *Iron Duke*, carefully plotted on a chart, combined with plottings of own forces which were known or could have been easily ascertained, and if all these plots are carried forward according to known conduct of British forces and reasonable assumptions as to enemy movements, there is presented an interesting diagram for contemplation. The construction of such a diagram would not have been a simple matter; as has been said, it would have required a highly developed "combat intelligence" service with a trained "fleet control" system of plotting. Neither the British nor the Germans nor any other navy had such a service and system. The need for it is one of the outstanding lessons taught by the experience of Jutland.

The progress made in air reconnaissance, if anything, adds to the importance of having an adequate "combat intelligence" service with a trained collating and plotting room party.

EXAMPLE OF GOOD INTELLIGENCE WORK

In 1914, while the U. S. S. *Connecticut* was at Port-au-Prince, Haiti, Admiral Caperton sent Maj. George Van Orden of the Marine Corps on shore to make a study for the preparation of orders for a landing, should conditions require the seizure and occupation of the capital. Van Orden, with his accompanying naval officers, gave attention to the selection of a landing base, proper approach to the city under security measures, to strategic points that should be held and manned, the location of enemy barracks, the character of the flanks along this line of advance, and other details. Within a year the *Connecticut* landed its column of bluejackets and marines at the Bizoton Navy Yard, and carried out with precision an orderly and logical plan based on the information that had been secured and studied. Thanks to this foresight, Port-au-Prince was entered and occupied with a minimum loss of life, and with a celerity that paralzyed the attempts of the Haitians to oppose the advance and seizure.

THEORIES OF STRATEGY

PART II

By Captain Groos, German Navy

EDITOR'S NOTE.—*A German naval officer reviews a recent volume, "Theories of Strategy," by the well-known French naval writer, Admiral Castex.*

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THE SUBMARINE WEAPON

Even as late as the Russo-Japanese War, naval warfare was conducted without the employment of submarines. Later it was generally held that the importance of the submarine lay primarily in coast defense, while expert opinion was divided with regard to the possibilities of its employment in battle. In any event the effectiveness of the submarine was considered as very limited up to the war of 1914–1918, and in particular until the use made of the submarine by the Germans proved the contrary. To be sure, the submarine was employed primarily as a weapon against overseas communications, while its effectiveness against the organized forces afloat was greatly diminished. Castex is also correct in his contention that, contrary to the frequently expressed opinion, the submarine commerce warfare on the part of the Germans had neither been foreseen in time of peace nor prepared for. When he states further that at the outbreak of the war Germany did not possess more submarines than the other nations, he forgets to add that the German submarines, contrary to the submarines of other nations, were designed for employment on the high seas and therefore had a relatively great cruising radius. Only because the industry was not technically equipped to fulfill all these requirements at the start did the German Navy lag behind in the construction of submarines. For this reason alone Germany entered the war with a relatively small number of submarines. But these few submarines were already extraordinarily effective.

In their first undertaking the submarine offensive was directed against the ships of the Grand Fleet in accordance with the general operations plan, and the idea of submarine commerce warfare was evolved later, solely as a result of the holding back of the forces afloat. In making this decision the German naval authorities were

fully aware, as were all others, that history has repeatedly shown commerce warfare, when conducted to the exclusion of all other operations, results in inevitable failure. Castex assumes, however, that for them (the Germans) the technical possibilities of the submarine were so revolutionary and of such far-reaching importance that they were capable of upsetting the accepted fundamental principles of naval strategy. In any event, in the operations against enemy communications, this weapon possessed possibilities never before available. In the submarine one possessed a commerce destroyer which could maneuver in three dimensions. Although the submarine is not so swift in approach and attack, its shield of invisibility permits it to creep quietly up on its prey until the moment arrives when it can be destroyed by gunfire or torpedo, with a degree of surprise possessed by no other commerce destroyer up to that time. With regard to the escape, which offered the most difficult problem and was the basis of the cruiser warfare, the submarine could accomplish this by simply submerging. It was not even necessary, as in previous times, to arm the boat to engage the enemy cruisers. The battle effectiveness, which in former times led to a constant increase in the tonnage of the commerce raiders at the expense of their numbers, does not enter into the question in this case. Submerged, the submarine as well as the torpedo remained a terrible weapon, while on the surface it could make use of its guns like any surface vessel. In addition, with the development of the new type of motor, the submarine was given a greatly increased cruising radius. Further, the cloak of invisibility allowed the boats to return to their own harbors no matter how unfavorably these might be situated, as was the case with the German bases. Of what importance was the enemy superiority in surface craft in the face of such a weapon? Owing to the submarine, the protection afforded the British overseas commerce by the Grand Fleet became meaningless. It seemed almost as though the old idea of cruiser warfare might experience an unexpected revival as a result of the technical developments of the twentieth century. But this conception involved an overestimation of the technique which was comparable with the case of the steam-driven commerce raiders of the American Civil War and the ideas of the jeune école, who fell into the same error when the torpedo and mine appeared. Such sudden technical developments are, according to Castex, simply "volcanic outbreaks without a future, whose effectiveness diminishes with time, and which in the nature of things can not be otherwise in time to come." In every case one is compelled, however, to await the results of experience to avoid drawing erroneous conclusions for the conduct of war on the basis of these innovations. This has been the case, to some extent, with the submarine.

Naturally, the enemy was surprised at first by this new form of offensive, but in the face of the enemy countermeasures, which were soon inaugurated, the submarine frequently found itself compelled to renounce a problematical torpedo shot and to come to the surface in order to use its guns. In doing this it partially abandoned the advantage it derived from its ability to maneuver in three dimensions and operated like the destroyers of former times. The countermeasures in such cases were relatively simple, since it sufficed to arm the merchantman with guns permitting him to offer resistance—a measure likewise derived from the experience of former centuries. "In order to protect the surface, one employed this means (gunfire) to force the submarine back into the depths." The practice of patrolling the sea lanes and the focal points of the ocean routes with light surface craft was less successful—a mission for which the number and the cruising radius of the patrols at that time proved inadequate. They were never on hand when they were needed and where something interesting was developing, entirely aside from the fact that these concentrations of patrols on being sighted in definite areas, promptly betrayed the sea routes to the submarines. Lack of mobility and the necessity of holding certain definite areas at sea, were the greatest drawbacks to this procedure. In such operations the initiative remained with the submarines and up until July, 1917, it "must have been a real pleasure for them to deal with an enemy which made use of such methods."

Thus, in the early months of the year 1917, the "great crisis" was reached. In order to meet the emergency the Allies finally decided to adopt other tactics—the employment of the protected convoy, a procedure taken from the experience in former wars but whose advantages had been only too quickly forgotten during the long interval of peace. Much had been written about its disadvantages, the loss of time involved, and the resultant inefficient utilization of the available ocean tonnage, as well as the difficulties in handling a number of ships of different speeds; but in the face of such a crisis the academic detractions of peace time lost much of their weight. To-day the allied powers pride themselves on the adoption of this system—both the English and Americans laying claim to having originated the scheme. It is not to be wondered, therefore, that Castex in his book claims the honor for the French. The difference between the present practice and the former procedure lies in the fact that the protected convoy represents the maximum concentration of defensive means as opposed to the scattering of same when the indirect means of protection—patrolling certain areas—is adopted. Further, the route which the protected convoy followed could be quickly altered in the case of danger much more readily than the cumbersome patrol of definitely fixed areas. Thus the submarines, instead of being

able to attack their prey primarily at points where the sea lanes converged or near important landfalls, were compelled to disperse over wide areas. They were thus deprived of the initiative and compelled, strategically as well as tactically, to follow certain lines of action. The final result was the development of a new type, the submarine cruiser, having a very much greater radius of action and armed with powerful and long-range guns. This, however, involved the renunciation of a number of advantages of the previous types, such as small displacement and large numbers, combined with cheaper and quicker construction, as well as the employment of the torpedo as the exclusive weapon. The moment, however, in which the submarine found itself compelled to operate with gunfire instead of torpedoes, its superior fighting qualities were lost.

Forced into this new line of development, the submarine forgot its origin and forefathers and sought "to enter the family of surface craft by adopting their customs and fighting methods. It felt that it could accomplish great results only by controlling the surface of the water with its guns. Since the proper gun carrier on its own side, the High Seas Fleet, had left the submarine in the lurch by remaining in its bases, the submarine sought to make up this lack in themselves, cost what it might, and thus avoid the penalty for violating the law requiring the cooperation of the various parts of the fleet." In this manner the submarine gradually, in the course of time, lost more and more of its original fighting qualities. "Such a violation of one of the fundamental military laws could not go unpunished. In this case the most important weapon (here it was the High Seas Fleet) was left out of battle and exertions demanded of the weaker weapon (the submarine) which were far beyond its strength." In this connection Castex does not deny, however, this condition was forced on us by bitter necessity, brought about by the great inferiority in surface craft and that under such conditions a submarine of great tonnage with heavy armament might render good service. To this extent he considered the German submarine cruiser fully justified, but, in his opinion, reliance should not have been placed in this type alone to force the decision while holding back the High Seas Fleet.

Among the anti-submarine measures adopted, the direct chase, even when supported by the newly invented aids, proved less efficacious than "lying in ambush" around a convoy—a procedure which combined in itself all the advantages of the offense and defense. The submarine traps operated on the same general principle, since sooner or later the submarine was compelled to show herself in the vicinity of the object of her attack. Mines were also very effective, particularly when employed in waters which the sub-

marines were compelled to traverse, such as in the northern part of the North Sea, and the Straits of Dover and Otronto. The attacks on the bases of these commerce destroyers should, according to Castex, be listed as third among the classic methods of defense for the overseas communication. In the war of 1914–1918 this method only appeared in the belated effort to block the harbors of Zeebrugge and Ostende. " It was impossible to conduct operations against the German coast, and although something of the kind might have been attempted against the Austro-Hungarian coast in the Adriatic, no such operations were undertaken."

One might say that the submarine warfare failed in the end only because the German submarines suffered under the disadvantage of their geographical position. It might also be argued that, for a long period, this form of warfare labored under stringent political restrictions. This might possibly be counterbalanced by the fact that the submarines were favored for several years by the above-mentioned failure to organize the antisubmarine forces. Later, however, according to Castex, the submarine derived another great advantage from the fact that Germany then had almost every maritime nation arrayed against her and could therefore attack all shipping with impunity—a political situation which will scarcely be repeated.

It has also been argued that the submarine warfare would have proven more successful had the Germans waited a longer time and then delivered a surprise attack with their full strength. Castex believes that even under these conditions both sides would have ultimately found themselves in the same relative positions even though the curve of losses, coming to a peak somewhat later, had been higher than it actually was. The final result was that the submarine, alone and unsupported by surface craft, proved inadequate to the task of obtaining control of the seas. For its part, it was incapable of either protecting its own important overseas communications or of wrestling control of the seas from a strong enemy. On the contrary the enemy was rather enabled to maintain its own overseas communications to the end of the war. Certainly, the transport of troops often proved highly dangerous and costly and very critical situations arose; but to the end the Allies held the upper hand. For this they have to thank the Grand Fleet, which was sufficiently powerful to prevent the German Fleet from undertaking operations against the antisubmarine organizations as well as the convoys. Where such attacks were actually made by surface craft—Castex recalls the exploits of the *Brummer* and *Bremse*, as well as those of several boats of the Flotilla 11 in the fall and winter of 1917—the results accomplished in these cases far overshadowed those achieved by the submarines in similar circumstances. These exploits, however, remained as out-

standing exceptions and could therefore not alter the final result as a whole. They were proof that submarine warfare can only aid in bringing about a decision when one is able to dispute the control of the seas with the enemy through the employment of surface craft. In this case the means on the German side were inadequate. As Castex forgets to mention, they sufficed only to the extent that the High Seas Fleet was able to keep the exits of the German bight clear and to defend them until the end of the war. On the other hand, in those seas where the western powers employed only submarines and light craft, such as the Sea of Marmora and the Baltic, the Germans and Turks were able to maintain uninterrupted control of the seas. Incidentally, a similar condition obtained with regard to mine warfare. The side which possessed control of the surface was also the side in a position to conduct the mine warfare with greater effect. The successes of the German submarine mine layers and the individual auxiliary cruisers could do little to alter the final result.

From the combined experiences of the war of 1914–1918, Castex derives the principle that the power which controls the surface of the waters will dominate the overseas communications most valuable for its own purposes despite the activities of the submarines, and that this new weapon, employed exclusively and alone, can not diminish the effectiveness of this control. The lessons of the past regarding cruiser warfare also hold without change for this new form of warfare. The submarine can never replace the organized force on the surface—the surface fleet—but can only obtain decisive results when working in conjunction with surface craft. There are two forms of warfare, one on the surface and one beneath the surface; both forms must be fitted into the conduct of the war as a whole in their proper relationship. This does not mean that the greatly superior qualities of the submarine for attacks on the enemy communications need be denied, when, owing to other limitations, it is impossible to make such attacks with other means. No one will voluntarily surrender this great advantage, particularly in these days when the overseas communications are so vital to the nations in time of war, and every means by which they can be threatened must be welcomed.

But will these attacks ever again take the form they did in the war of 1914–1918 and produce such far-reaching results? Castex poses the question to deny it, and then asks whether every vessel within range will ever again be torpedoed without investigation, as was done by the Germans, even though provision be made for saving the crews. In this connection, Castex believes that such procedure will be followed in the case of convoys escorted by warships which leave no doubt as to the identity of the vessels, and that under such conditions the saving of the crews might well be left to the escort.

Even the British admitted that such protected convoys bore a military character which justified such offensive measures against them. But will it be possible to proceed in such a manner against individual ships? In such cases a strong protest must be expected from the neutral powers. "Belligerents in the future will be denied the wealth of opportunity offered the Germans in the last war when the majority of the maritime universe was against them." The question resolves itself into a political matter of the first degree, in which the rights of the neutrals must be respected and the procedure based on these considerations, involving the stopping and search in commerce warfare and the conduct of submarine warfare in accordance with prize rules. But in stopping these ships the submarine exposes herself to grave danger in the event the ship proves to be an enemy and happens to be armed. "The dilemma is very apparent and this fact alone will suffice greatly to diminish the success of submarine commerce warfare in the future." In any event one must take care not to overestimate the results in the future on the basis of examples taken from the war of 1914–1918. According to Castex, the balance between military necessity and political restrictions may be worked out—it will be necessary to push this employment of the new weapon against overseas trade routes to the limit to which it can be carried without incurring too great political consequences. Everything will then depend upon whether a reasonable standard can be found for this method of warfare.

In comparison with the operations against enemy communications, the submarine attacks on the organized forces afloat during the war of 1914–1918 were negligible. Naturally, every opportunity offered the submarine for attack on enemy squadrons or individual warships was gladly welcomed, but such opportunities were seldom sought. Even in the commerce warfare the submarines seldom attacked patrol vessels on the trade routes, but sought to avoid them, as did the commerce raiders of former times. This Castex considers a grave mistake, since the destruction of such warships would have rendered the situation much more serious for the allied powers. He forgets to mention that such attacks offered little prospect of success and involved risks which would have jeopardized the principal mission.

Aside from a few successes in the beginning, the submarines, thrown on their own resources, proved to be ineffective against enemy warships. In order to cooperate with surface craft the primary requisite was an improvement in the means of communication between surface craft and submarines, and this was only achieved after a lapse of time. Operations of this nature were first initiated by the Germans in the spring of 1916 after Admiral Scheer had assumed command of the High Seas Fleet. In this undertaking the subma-

rines previously disposed in certain areas and sectors were not only assigned an offensive rôle, but on them devolved the additional mission of protecting the advance and retirement of the High Seas Fleet from certain flanking positions. At first these movable lines of submarines were disposed directly across the probable courses of the enemy on standing out from their bases, but the lines were laid too close to the enemy coast. After the disappointing experience of the Battle of Jutland, these lines were moved in closer to their own fleet in order to insure greater certainty of tactical cooperation. This procedure resulted in a certain measure of success for the first time in the German Fleet operations against Sunderland, where the German submarines not only furnished important, if not decisive reconnaissance, but torpedoed two enemy cruisers, which fact, Castex neglects to mention, caused the withdrawal of the English Fleet. This method of procedure was not further perfected, since the submarines were later employed almost exclusively in commerce warfare. Even less has the attempt ever been made to employ the submarines directly on the field of battle. This development must sooner or later occur along the lines of direct cooperation with surface craft in order to equalize the weaknesses inherent in the submarine, viz, low speed, restricted outlook, meager supply of munitions, and unreliability of communications.

All in all the results of the war of 1914–1918 show that the assumption that the submarine would displace surface craft was somewhat prematurely taken—on the contrary, the latter remains in its key position. As Castex asserts, the submarine is incapable of blockading them in their harbors and preventing them from undertaking operations against other surface craft or areas, provided certain precautionary measures are adopted. When engaged with enemy surface craft, the submarine, although far distant, requires the support of surface vessels and, instead of rendering the latter superfluous, simply supplements their operations.

Moreover, the submarine serves to enhance the liveliness of naval warfare, its mobility, its quick decisions and rapid concentrations, since a delay, or too long a stay, in one vicinity may prove dangerous to the surface forces. In general, the established principles of naval warfare of any form, hold for this new weapon. If information regarding the enemy is frequently lacking in the warfare on the surface, which can not be allowed to detrimentally influence the decision to be taken, how much more is this the case with respect to enemy submarines, whose movements will be even less definitely known? The opportunities for outmaneuvering the submarine will be greater when one is able to prescribe their line of action (i. e., deprive them of the initiative). Sudden and unforeseen concentration and rapid movement of this force to the scene of operations,

will probably render the submarines relatively impotent. The history of the war of 1914–1918 contains many examples to show that where such procedure was followed, the efforts of the enemy submarines were of little avail. Therefore the basic principles of strategy are little affected by this new weapon, when they are considered in a broad sense.

On the other hand, the methods of conducting operations at sea have been greatly influenced by the entrance of the submarine in naval warfare. As a result of the special properties of the submarine, and, above all, its invisibility, it is able to extend its operations in time and space to a far greater extent than the surface vessel. Therefore we shall have to be prepared for submarine attacks in all areas and at all times. The various defensive measures such as antisubmarine screens provided by torpedo boats and aircraft, the steering of zigzaz courses, high cruising speed, and other means must be adopted the moment the fleet leaves port and continued until the fleet is again in port. Owing to the ability of the submarine to avoid an advanced screening force and to appear suddenly at any place ready for attack, it follows that the direct protection of overseas communications and coastal areas requires more attention than has been devoted to the problem heretofore. This necessitates the system of protected convoys and the extensive employment of suitable antisubmarine measures in the vicinity of own coasts, in the narrows, particularly near important points. Of even greater importance is the fact that in the future the blockading forces must be kept at a much greater distance from the enemy harbor than was formerly the case if the enemy possesses submarines. It is the author's opinion that the Main Body must be kept in distant bases, and direct supervision of the blockaded ports must be left to the light force—light cruisers, torpedo boats, and submarines—as was the case in the last war. The question of suitable bases which are permanently or partially safeguarded against submarine penetration therefore becomes a matter of primary importance. Also, the value of high cruising speed as the best defense against torpedo attacks is so manifest that a further increase in the speed of the surface craft is intimately linked with the underwater speed of the submarines.

Finally, the conditions governing operations against the enemy coast have been appreciably altered by the appearance of the submarine in naval warfare. Although surface craft may, even to-day, stage a demonstration or bombardment against the enemy coast, if this is carried out as a surprise attack at high speed, the danger begins the moment the surface craft are compelled to stop for any length of time in the vicinity of the enemy coast, either to disembark troops or for other reasons. Unless adequate provision is

made for antisubmarine protection, such operations are practically impossible. The greatest danger from the submarine, like the other invisible weapons, the mine and torpedo, lies in the difficulty in avoiding it and in hitting it when delivering an immediate counter-attack. Although we had to count on the presence of enemy submarines during the last war in the immediate vicinity of the enemy coast, in the future we shall have to be prepared to encounter them everywhere and to find mine fields in depths which were formerly considered out of the question. The result is a limitation imposed on that most valuable possession of the strategist, freedom of action, a fact which puts him in a less enviable position in comparison with former times. As a result of the employment of this new weapon, dangers will arise, which, contrary to the beautiful language which we use in times of peace in referring to the spirit of the offensive, will make it a burden not to be lightly assumed.

In order to regain this freedom of action, at least to some extent, efforts to-day are being directed toward increasing the flotation of the battleships to the utmost by localizing the damage which can be inflicted by a mine or torpedo—a technical problem which is fully capable of being solved. But the solution depends upon a further increase in the size of the individual ship at the expense of its numbers, a fact which involves other detrimental consequences, since the unavoidable laying up of such a ship for extensive repairs after being struck, makes its loss doubly felt. The second and also incomplete solution lies in the increase in the number of light craft at the expense of the total fleet tonnage, thereby reducing the strategic effect of a single hit. Even during the submarine commerce warfare, the employment of small and medium-sized freight steamers was found to be advantageous for the same reason. Regarded from this point of view, it appears that the submarine menace serves to restrain the natural tendency toward the ever-increasing displacement of the battleships. Naturally, every effort will be made, as before, to bring as many guns to bear in a decisive action as possible, but this will be accomplished by using more ships of a smaller type, thus reducing the submarine danger and increasing the freedom of action. Following this line of thought, Castex sees an accord with the ideas of the jeune école which, although exaggerated in their day, may be revived in the future as a result of the submarine menace. As an example, he cites the trend of development in the Italian Navy, in which, in his opinion, there is a tendency away from the standard displacement laid down by the Washington conference, a larger number of vessels being favored over greater displacement for the above reasons.

A further influence of the submarine is visualized in the fact that the light forces required for antisubmarine duty, for blockade,

and the protection of ocean-borne commerce and similar missions, must be increased at the expense of the battleships. The participation of these guardians in the major fleet operations will become more and more extensive, while the more valuable battleships, which will serve primarily as a supporting force, will be held back except in cases of urgent necessity. The use of the torpedo from other carriers, such as aircraft and surface craft, especially in narrow waters, as well as the employment of bombing planes, must necessarily exert a similar influence on the development of the ship types and composition of the fleet.

In so far as the further possibilities of utilizing the submarine are concerned, one thing has not as yet been attained; that is, the direct employment of submarines in tactical conjunction with surface craft in battle. This use of the submarine is particularly important because in such a situation one can never concentrate enough means at the decisive point to make victory a certainty. After the success of the German submarines on August 19, 1916, this procedure must be given consideration in the future. For this reason the English built the boats of the "K" class with relatively high speed on the surface as well as submerged. It is far easier to express this desire than to insure its fulfillment. It is extremely difficult to combine such heterogeneous elements as submarine and surface craft in one and the same tactical operation, owing to the great discrepancies in speeds, the differences in range of the guns, and means of using their respective weapons, as well as other tactical considerations. Joint operations can only be considered at the expense of one or the other type. Whether the movements of the submarine are made dependent on the surface craft or vice versa, the most important fighting qualities of one of the types will be sacrificed. Therefore, according to Castex, the sole possibility lies in a further development of the procedure employed by the Germans on August 19, 1916—the separate employment of groups of submarines and surface craft in accordance with a unified plan of operations. In his opinion such procedure opens up new horizons, a wealth of possible combinations, far greater than the "crude application" of the basic principle of concentrating all the forces at one and the same place, provided only the lines of submarines are staggered and so extensively distributed that the enemy surface craft will be unable to escape through a hole in the net.

With regard to tactical reconnaissance, the low speed and range of visibility of the submarine prevent it from serving efficiently as a scout, or in maintaining contact with surface craft. It was the lack of these qualities which resulted in the failure of the scouting operations of the 10 German submarines against the English Fleet from August 6 to 10, 1914. On the other hand the submarine

may render excellent service in strategic scouting by the continuous patrol in certain areas, which may even be located at a great distance, such as directly off the enemy bases. The submarine is thus enabled to obtain information regarding the general attitude of the enemy, the disposition of his forces and similar facts. As an example, Castex cites the reconnaissance of the English coast made by the German submarines just prior to the bombardment of Scarborough in 1914, Yarborough in 1916, and off the Russian coast before the landing on Osel. In such cases the great advantage of the submarine lies in its shield of invisibility, which permits it to carry out its mission unperceived by the enemy. It is true, that in some cases it may be compelled to remain at great distances from the coast or the enemy base owing to the enemy antisubmarine measures. This was the cause of the meager results of the German submarine reconnaissance when the English Fleet was standing out on the eve of the Battle of Jutland. On the other hand the German bight was constantly supervised by English submarines throughout the entire war, and in fulfilling this difficult task they rendered excellent service. The same was true of the French and English off Cataro.

At the same time the submarine proved herself to be an effective means for combating enemy submarines. Twenty German submarines were destroyed by the attacks of English submarines. Thus, as Vice Admiral Michelsen states in his book, The Submarine Warfare, and as should be added here, "the submarine is not only the offensive weapon of the weaker power at sea, it is also the means of protection of the stronger." According to Castex, the importance of the submarine as a mine layer is characterized by the fact that in the last war the skillful tactics of the German submarine mine layers in laying individual mines throughout large and important sea areas and off the enemy coast, made it necessary for the enemy to employ over 1,000 small vessels with crews of 30,000 men for mine-sweeping operations in the beginning of 1918.

For raids, surprise attacks, and the bombardment of important points on the enemy coast, in which the moral effect caused by the sudden appearance and disappearance is greater than the material damage inflicted, the submarine is preeminently qualified. Based on these considerations, large submarines with heavy armament have been constructed by several navies. These are boats of 3,000 tons and over with heavy guns—a continuation of the German submarine cruiser idea. On the other hand, Castex considers the project of the armored submarine, even though technically feasible, a grave mistake, owing to its high cost of construction and even more to its relatively great vulnerability in an artillery duel, as compared with corresponding surface craft. Nothing should be carried to extreme.

For the rest, it is remarkable that with all its numerous qualities above mentioned, the submarine should have proven somewhat of a disappointment in fulfilling the purpose for which is was originally constructed, namely, coast defense; the more so, since the German submarines proved themselves capable of rendering excellent service in distant waters as far removed as the Azores, Liberia, and even the coast of the United States. We must admit that the English submarines were never able to defend their own coasts against the raids of the German naval forces, but on the other hand the losses sustained in a few days by the battleships off the Dardanelles, as a result of the activities of the *U–21* were decisive in the defense of the Straits. Certainly, in this case the enemy did not count on the presence of the submarine in those waters. If, in such cases, the attacking forces remain constantly underway, it will be difficult for the submarine, with its low speed, to make an approach on them. Therefore, according to Castex, provision will be made in the future for the defense of the most important points along the coast by submarines, while the remainder will be left to carry out their special mission.

Summarizing, he judges the novel and interesting possibilities of this new weapon as similar to the introduction "of a new piece on the chessboard of war; an additional piece which fits in with their play but does not displace any of the other pieces." It makes possible certain operations which were formerly impossible of execution; it extends the theater of war in a surprising manner, and, in this way, enriches the number of possible strategic combinations as well as the tactical procedure. But in this new weapon Castex finds its greatest importance to lie in the fact that the belligerent, who as a result of great inferiority would formerly have been committed to the rôle of defense, is now no longer obliged to adopt this passive attitude. "The Germans, pushing this idea almost to the extreme, have demonstrated clearly the manner in which war should be conducted in such cases, and our forefathers at the time of the French Revolution would have given much to have possessed a similar weapon." Naturally victory can not be expected from the exclusive employment of this weapon. In the final analysis the control of the seas on the surface will always remain decisive. Still, the ceaseless employment of the submarine, in the manner discussed above, will save the morale, honor, and prestige, which may have a considerable political reaction in the future. Castex therefore regards the submarine as the outstanding weapon of the weaker nation, serving to counterbalance the enemy superiority in the surface warfare.

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The Defense of Ports. By Lieut. Commander J. D. Prentice, R. N. (Journal of Royal United Service Institution, February, 1931.)

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PREFACE

This special issue of the INFORMATION BULLETIN is made up of reprints from foreign magazines. The subject matter is considered of sufficient professional interest to merit bringing it to the attention of the service and making it available for convenient reference.

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REFLECTIONS ON AERO-NAVAL WARFARE

By Lieut. de Vaisseau Barjot

EDITOR'S NOTE.—*The following extracts are taken from an article in "La Revue Maritime" of April, 1931.*

A recent article in La Revue Maritime showed the present tendencies of aviation in Italy (issue of July, 1930).

It is common knowledge that these tendencies result from the theories of General Douhet on aerial warfare and the independent air force, and can not be sustained in Italy without encountering active opposition on the part of the Navy.

Opposition to a system of organization, without doubt, but, equally, it seems to us, to the doctrine. Is the doctrine of aerial warfare in contradiction to that of naval warfare? This question, which interests all great navies, deserves to be examined.

We believe, in fact, that the true causes of the aero-naval controversy should be sought in the diversity of ideas which have arisen on the subject of the possibilities of aerial warfare at sea. Accordingly, only a comparative study of the essential characteristics of the aerial warfare envisaged for the future, and the permanent characteristics of naval warfare will permit an opinion, approximately correct, to be made on this point.

Let us recall the essential principles of the doctrine of aerial warfare, such as were pronounced by General Douhet himself:

1. The fundamental objective of aerial warfare is control of the air.
2. The maximum efficiency of national aerial forces will be obtained in uniting all of them, with no exceptions, in an independent air force.
3. This air force, to accomplish its objective, should be composed of a mass of "appareils de bataille" (fighting craft).
4. Other aviation facilities, qualified as auxiliaries, are, in comparison to military aviation, "useless," "superfluous," and "dangerous."

"Useless" because they can not be used if one has not control of the air. "Superfluous" because if one has control of the enemy sky the air force can proceed to operate against an adversary that is no longer able to take the air. "Dangerous" because in separating a part of the air forces the chances of obtaining control of the air are diminished. Therefore, "auxiliary" aviation activities should be suppressed for the benefit of the independent air force.

This conclusion, to appear bold, is, nevertheless, logical, if the point of departure is accepted, that the control of the air is the primary objective of the aerial forces.

We admit that these words, " control of the air," have not an absolute sense; that they correspond to something extremely relative, temporary, and local; but that they represent, meanwhile, a sort of ideal condition that one has to exert himself to realize.

We will admit the initial principle of " control of the air," but we will discuss the practical application of it. Also, we will examine some conditions of aerial warfare (such as are extolled by its most hardy supporters), possible at sea, and particularly by what methods one is able to obtain control of the air over the sea.

We have already covered this question in a preceding study (Revue Maritime, November, 1930) and will recall certain of the conclusions.

II

On land, or, more exactly, above a territory, control of the air is, theoretically at least, the essential factor of aerial defense of national territory, as well as of the attack 6f enemy territory at its vulnerable points.

It is evident that the best means of arriving at this ideal is to destroy the organized aviation forces of the enemy. This is at present the rôle of the pursuit planes. Here let us comment that one of the theorist of aerial warfare envisages " battle planes " instead of actual pursuit planes. This " battle plane " is a modified pursuit plane, a combination pursuit plane and bomber, consequently capable of fighting in the air, and of bombing vital points in enemy territory. Without discussing here the question of " battle plane," which we will take up later, we wish to note that this plane should fulfill two entirely different missions, the attack of enemy aircraft and the attack of enemy territory. It can be seen that the qualities required for the accomplishment of the first mission are contradictory to the conditions demanded for the execution of the second.

If we consider the first mission, the destruction of the organized aerial forces of the enemy, as primary, we return to the conception of an aviation specially designed for aerial combat. We will call this " combat aviation." The combat plane, either the present monoplane, the biplane, or multiplane predicted for the future, is a plane which has for its primary mission the destruction of enemy aircraft. Its action is then essentially offensive. On this point we separate clearly from the theorists of aerial warfare who class bombing planes in the category of offensive aviation, and refer to the pursuit planes as a defensive aviation. We should consider, more logically,

the aerial combat of destruction as in advance of war in the enemy territory.

We know that in modern warfare it is no longer a question of defending the frontiers alone. It is necessary to-day to protect the entire vulnerable surface of the country against aerial attack. One is led, then, over the extent of national territory, to organize a series of permanent aerial bases sufficiently numerous to permit great strategic mobility of the combat forces, their rapid concentration in one zone or another for defensive action or for a massed offensive. These fixed land bases being organized, the aerial combat forces are able to begin in a manner "independent" in relation to the land forces.

III

At sea the conditions are entirely different. Although the directive principles remain identical, the means change. No fixed bases exist outside of the coastal bases. From the time that one operates in the open sea the only possible aerial bases are the surface ships.

Of the surface ships, the first in value are the aircraft carriers. According to the theory of aerial warfare, the aircraft carriers should be armed not only with "auxiliary" aircraft designed for reconnaissance and for attack of a floating enemy, but before all with aircraft designed for attack of enemy aviation.

Meanwhile, these sea-going carriers of aircraft are vulnerable not only to aerial enemy against whom they properly defend themselves with their combat planes, but very vulnerable to enemy surface or submarine attacks. It is necessary to protect them against the enemy naval forces, surface or submarine. That is the work of the naval planes, and of the so-called combat vessels, the battleships, cruisers, destroyers, and submarines. The latter by their guns, their torpedoes, and their depth charges protect the aircraft carrier, which, in turn, protects them with their planes. This mutual protection is the base of all aero-naval operation.

Necessity demands, more and more, that we seek to embark, outside of the special ships, light planes on all combat vessels that may be so equipped. This tendency is manifested already in the Italian Navy. It has existed for a long time in the United States Navy.

In summarizing that which concerns aircraft carriers or combat vessels armed with planes, the actual conduct of aero-maritime warfare leads to an essentially naval question, that of control of the sea, or, more exactly, the control of the surface of the sea.

First conclusion.—While operating over a territory, aerial war may be conducted in a practically independent manner, because combat aviation operates from its permanent and fixed land bases. At sea, aerial warfare is directly connected to naval operations, that is, to operations concerning control of the sea.

IV

To dispose of the surface of the sea is a heavy obligation to put upon aerial warfare alone. One can not be content with coastal bases alone in extending the range of action of the planes. The question deserves to be studied more deeply.

A question much discussed and which is resumed again: "Aerial cruiser or the monoplace pursuit plane." Certain military authorities place great hopes on the planes of great tonnage. Lieutenant Jan-Kerguistel forsees, at sea, the use of special planes, the "hydravions destroyers," to which he attributes a long cruising radius. To see clearly into the possibilities of such apparatus, it appears logical to return to definitions.

We have defined the combat plane, that which has as its primary mission the attack and destruction of aerial enemy. It is, first of all, in the air, an offensive weapon. In seeking to augment the offensive qualities of an airplane, the technique of flying machines suffers from certain restrictions.

The analysis of the offensive and defensive qualities of an airplane leads to very definite conclusions which one may call the essential laws of military aeronautic material. Aerotechnique being still hesitant and in course of evolution, we have been able to enounce these laws only in taking as a term of comparison, the ships.

The offensive qualities of a combat plane consist, on one side of the aerodynamic qualities, high horizontal and climbing speed and ease of control, and on the other side its power of destruction, efficient gunfire.

The principal defensive quality should be a worth-while protection.

Therefore the first law of military aviation material may be expressed as follows:

1. The offensive aerodynamic qualities of an airplane are incompatible with a long cruising radius.

The search for horizontal speed leads to the development of motive power and improvement of the aerodynamic fineness which is a matter of patient study and slow progress. For a determined fineness it is the power of the motor which permits, most directly, the increase of speed. But doubling the power of the motor means doubling the weight of combustible carried if the radius of action is to be conserved at the same time. It can be seen that the speed has a direct reaction on the range of action.

A high ceiling and a high climbing speed imposes at the same time a relatively light load and a great motive power in proportion to the weight of the apparatus.

Maneuverability in the three dimensions demands, outside of certain wing qualities, the same characteristics.

Thus the offensive aerodynamic qualities, horizontal speed, climbing speed, and maneuverability, operate together to require whatever the tonnage of the airplane, a high motive power relative to the total weight to be lifted.

The law of weight to be raised, which rules with so much severity the construction of all flying machines, becomes, in the case of the combat plane, particularly severe. No surplus weight can be allowed, as it automatically diminishes the speed, ceiling, and maneuverability. In the present state of science the range of action represents considerable weight of combustible and more considerable if the motive power is large. Range of action is represented by a dead weight which is opposed to the offensive qualities, speed and maneuverability, demanded for aerial combat.

There remains another offensive quality, that of power of gunfire, which has been little developed. The weapons for aerial combat are more nearly the machine gun than an actual cannon, so called. It is probable that, in the future, the present machine guns will be replaced by machine guns of larger caliber, light automatic cannon, or something on the order of the Davis gun. These weapons will carry with them an increase in the tonnage of the airplane, but the relative weight of the motive power should not be augmented, and the total tonnage should be moderate if the other offensive qualities are not to be diminished. Practically all increase of the power of gunfire tends to reduce the range of action.

Meanwhile the search for higher calibers is not the only means of developing the power of gunfire. It should also be accurate and efficient at distances surpassing the present "pistol range." The ideal fire of airplanes against airplane requires, in the first place, high initial speed of the projectiles. Furthermore, it is essential to note that the conditions of modern aerial combat, with high speeds and quick accelerations in three dimensions, renders continuous aim with a movable mounted gun very difficult. In the present state of technique, bursts of fire, with a fixed gun, pointed by the airplane itself, is susceptible of a better efficiency. This fixed cannon alone permits, with projectiles of large caliber and high initial speed, a precision of fire by bursts, a precision otherwise able to be obtained only by a mount of considerable weight, provided that it is permitted by the inherent lightness of the structure of the plane. One may see how the artillery efficiency of an airplane is affected by the maneuverability, an aerodynamic quality.

Summarizing, either the monoplace or biplace combat plane has its range of action limited by the development of its offensive qualities. By range of action we understand not the distance it can fly in a straight line but the time it can remain in flight under combat

conditions. At sea, where the wind is a much more important factor than on land, this military definition of range of action seems particularly judicious. This period does not exceed three hours for the present pursuit planes. It is difficult to see how, except at the expense of the offensive qualities, this period can be appreciably increased. Since the World War the speed of pursuit planes has been approximately doubled, but the period of flight has not increased, but rather slightly decreased.

Let us consider, now, the defensive qualities of combat planes. The technique of flying machines leads us to enounce the second law of material of aerial warfare.

2. No airplane can be protected in an efficient manner.

It is evident that the combat plane can not carry shield plating without weighing itself down with a weight incompatible with its offensive qualities. No airplane, even of heavy tonnage, can be protected against modern artillery. A plate of special nickel-chrome steel of 26 mm. (1 inch) in thickness has been pierced by a bullet from the Hotchkiss 13 mm. (½ inch) automatic at over 50 yards. A similar plate of 15 mm. (0.59 inch) was pierced by the same bullets at 900 meters (2,952 feet). What plating, except an armor of prohibitive weight, will hold up under the fire of the 25 mm. (1 inch) automatic now under test?

(TRANSLATOR'S NOTE.—*Since the writing of this article the Hotchkiss Co. has developed and tested a 37-mm. (1½-inch) automatic that can easily fire 80–90 shots per minute for antiaircraft defense. The 13-mm. could be easily carried in a fixed mount in the plane or even in the moving mount.*)

Admitting the possibility of localized plate protection, the wings which support all the weight, are susceptible to the smallest high-explosive bomb.

If certain people believe in the possibility of protective plating on certain airplanes it is because aerial combat has not yet made use of the powerful firearms available.

The third law should be that of tonnage. This well-known law of naval construction repeats itself in aeronautical construction, but quite different, because of the third dimension. On the water this phenomenon, called the "Battle of the Squares versus the Cubes," favors clearly the larger ships. The "cubes" (tonnage, motive power) weigh heavily on the "squares" (surface of midships frame) and the speed increases with the dimensions. In the air the advantage that the weight takes over the surface appears as an increase of the wing loading, which makes a gain in horizontal speed but a loss in ceiling. Meanwhile the ceiling is an offensive quality, equally important with horizontal speed. One can admit, then, that the increase of tonnage does not influence the total of the aerodynamic qualities of an offensive airplane, as the gain in hori-

zontal speed is offset by the loss in climbing speed. In fact, for a hydroplane flying over the open sea the law of increase of tonnage is practically the same as for a fast ship.

In addition, the maneuverability is affected by inertia, and that is proportional to the tonnage.

Actual experience with aeronautical construction has not yet verified, in a practical way, the law of augmentation of tonnage relative to real gain in weight of the structure. Undoubtedly the metallic construction has destroyed the belief that increase of dimensions of planes must carry with it a prohibitive structural weight, but it does not carry any notable relief to the construction. Even with the hydroplane with metallic hull, it would be illusory to credit the increase in dimensions with any appreciable advantages from the point of view of protection. That is why we are able to say—

3. The defensive qualities of an airplane and its aerodynamic offensive qualities do not improve with the tonnage. The volume of fire alone can be developed by reason of tonnage, but we know that the gains are much more apparent than real. The efficiency of fire of plane against plane seems, for a long time yet, to be inseparable from the maneuverability of the plane itself.

V

Thus, from the point of view of combat, the airplane can not be compared to the ship.

On the surface of the sea the offensive and defensive qualities increase with the tonnage. It is, above all, the battle of the cannon and the armor that has led to the race in large tonnages. This makes the law of increase of tonnage inflexible.

In the air, on the contrary, it is not a question of gun versus armor. In the air the smallest gun is king. All armor is impossible, and consequences fatal for slowness. The combat plane can not, then, be a "dreadnought of the air" or a "flying fortress," but simply a light unit, that is, a unit denuded of all protection, speedy in all three dimensions, and, if possible, more speedy than all other airplanes. That is exactly why, because it can not be armored, that the combat plane should seek mobility and not stability, power by number rather than gross unitary tonnage. The defensive qualities of a combat plane are essentially dynamic. They should be sought in speed, maneuverability, and power and efficiency of gunfire, or, in other words, in the excess of offensive qualities.

The laws that we have just enounced, more or less schematically, on the subject of airplanes are not absolute. They may be applied in fact by means of certain compromises between opposing require-

ments. They do not, thereby, indicate any less the essential characteristics that a combat airplane should possess. It is useful, perhaps, to state them precisely at the moment when there seems to exist a diversity of opinions on this subject. The "two-purpose battle planes" of General Douhet, the recent "fleet reconnaissance fighters" of the British aircraft carriers, the problematic "aerial cruisers" predicted by our own forces for the future, all represent a more or less happy compromise. From the point of view of aerial combat we have obtained defensive apparatus, rather than planes truly offensive, apparatus capable of defending itself, but not the efficient "pursuit planes" or "hydravions destroyers" in the etymological sense of the word, the primary role of which should be to destroy enemy aircraft.

The light "diving bomber" of the American Navy, alone, seems to be the most successful compromise between a naval bomber and the pursuit plane, because these two types of airplanes require that same essential quality, maneuverability; who knows if these planes will not be used to-morrow to torpedo the too vulnerable mastodon of the air. The "diving bomber" should be, then, properly speaking, a combat plane.

VI

In résumé, the laws peculiar to flying machines of war lead us to the following conclusions:

1. The combat airplane can be, regardless of size and shape, only a light airplane. That is, light in relation to its motive power.

2. The combat plane can not be armored, and need not be of great tonnage. An increase of tonnage is advantageous only if the offensive qualities are thereby increased. On the contrary, the increase of tonnage tends to increase vulnerability (augmentation of silhouette) and to reduce its maneuverability (greater inertia). It does not increase sensibly the endurance.

3. The ideal prototype of combat plane is schematized by the "cannon plane," or a plane principally armed with an axially fixed automatic cannon. We do not wish to affirm by this that the plane should be armed for ahead fire only. Suitable efficient arms should be provided to prevent a surprise from the rear.

4. The combat plane, a light unit, is inevitably of limited range of action.

5. The combat plane, a unit of small tonnage, should operate in numbers.

6. Applicable to aerial warfare at sea, these conclusions carry another of capital importance.

At sea, combat planes, apparatus of reduced tonnage, can be and should be embarked.

Aviation afloat is required to be something more than "auxiliary aeronautics." It is a fundamental of aerial warfare over the sea. It becomes, according to the principles of General Douhet, the essential of the naval air force.

Afloat, the number factor requires the possession, on the surface of the ocean, of numerous bases for combat planes. Lacking a fleet of aircraft carriers, it is logical to embark the maximum possible number of pursuit planes on all war vessels that may be so equipped. Our "destroyer leaders" for example, actually small cruisers, can be equipped with a combat seaplane on a catapult.

The number factor will be, in the air, more important than on the surface of the ocean, where, since the appearance of the armored ships, the tonnage factor has become preponderant. The words of Nelson, "only numbers can annihilate," were more applicable to the wooden ships of his days than to the battleships of the present. The advent of the airplane, a light craft, brings back his words with all their truth.

Thus, aerial warfare, with the sole aid of coastal aviation, is only possible within the limits of the range of military action, necessarily limited, of the pursuit apparatus based on shore. From the time one proceeds to the open sea one must depend on the embarked combat aviation. Hence the second principal conclusion:

Second conclusion.—Control of the air over the sea, distant from the coasts, lies with the surface ships; that is to say, is directly connected with control of the sea.

VII

Under these conditions, what can be the rôle of an independent high-seas air force? We mean by this an air force consisting of seaplanes of gross tonnage, of which the *Dornier-Super Wal* of 14 tons. the *Rohrbach* of 18 tons, and the *DO–X* of 50 tons appear as the first of the type.

These great planes, dependent on coastal bases, should have, above all, a large range of action in time. Endurance in the air and at sea is with them the primary qualification. They must be cargo carriers. Their weapons—torpedoes, bombs, or depth charges—can be effective against surface or submarine enemy. Without wishing to predict the future, we have reason to believe that these independent seaplanes of gross tonnage will be advantageously utilized, in the less extended waters, as scout cruisers and as torpedo boats. This will seem to require a modification of the composition of future fleets. From now, a Dornier *DO–X*, capable of carrying four tor-

pedoes of 3,000 pounds each for a 10-hour flight at 100 knots, is, in the restricted waters of Europe, comparable to a destroyer.

But in aerial combat the characteristics of these heavy weight-carrying planes do not permit the offensive. Without doubt they may carry numerous defensive artillery, able to fire in all directions. But the efficiency of such gunfire is essentially bound to the stability of the platform. From this point of view the third dimension, as well as the lightness of structure of airplanes, makes the problem of gunfire more complex in the air than at the surface of the sea. Light planes, using powerful fixed guns, obtaining from their maneuverability the relative stability required for a momentarily precise fire, will always be superior in the attack, while remaining equal in the defense.

Held in the air to a rôle uniquely defensive, these heavy seaplanes should paradoxically but logically be classed in the category of "auxiliary" planes, useless to pure aerial warfare.

The aerial protection of such planes demands the return to the light offensive planes, always ready for the attack, and consequently embarked. The natural escort of the high-seas aerial cruisers will consist, if not of aircraft carriers, at least of fast surface ships armed with hydravion destroyers mounted on catapults. We believe that the true scouting cruiser of the future will be an independent flying unit, for which the surface cruiser will furnish the support. Furthermore, if it becomes advantageous to scout against a naval force by the air, it is equally necessary to blind the eyes of enemy aerial reconnaissance, all of which leads equally to the development of embarked pursuit planes.

Third conclusion.—Independent aeronautics on the high seas seems devoted to a specifically naval rôle. For its proper protection against an aerial enemy, this activity remains a tributary of embarked pursuit aviation, or, in the final analysis, of the surface ship.

VIII

In the end, the possibilities of aerial warfare over the sea lead us inevitably to this fundamental term, "the surface ship," to this necessity, free use of the surface of the sea. Now, control of the surface is precisely the objective of the forces called "naval."

Without doubt control of the air over the sea permits all naval aircraft, whether embarked or independent, to operate against a floating enemy. It is also certain that, in a measure, control of the air assists already and will be more prominent in the future in obtaining control of the sea. Reciprocally, control of the surface is indispensable to "clearing the sky" over the sea. From the time

that one clears the coasts, control of the air and control of the sea are intimately connected and can not be separated.

Aero-maritime warfare is, then, related to control of the sea, the final objective of warfare over, under, and on the surface of the sea. Hence the modern definition of this expression, " control of the sea ": " Control of the sea, to be effective, must, to-day, comprise not only control of the surface, but control of the water under and of the air above."

This definition has already been illustrated by the German submarine warfare. The control, by the Allies, of the water below the surface, so contested by the U-boats, was definitely obtained only by the multiplicity of patrols and sub-chasers, or, in short, by a better and more effective control of the surface.

Likewise, it appears that the true means of obtaining control of the air over the sea consists in possessing, on the surface, numerous bases for pursuit planes, which again leads to better control of the surface. The submarine is bound to the surface of the sea by reason of its low range of action submerged (less than 24 hours). In a like manner the combat plane is, by its endurance (3 or 4 hours), still more closely bound to the surface ship. The submersible has as its mortal enemy, the submarine engines, efficiently handled only by the light surface ships. The airplane may be driven from the air only by its type, the aerial destroyers, of which the action, essentially fleeting, needs stable support on the surface of the sea.

Thus, the submarine warfare and the aerial warfare enlarge upon, singularly, but without contradicting, even supporting, the ancient idea of control of the sea.

IX

The preceding definition shows that to obtain control of the sea, a modern naval force must necessarily be composed of—

Surface elements.
Submarine elements.
Aerial elements.

We have seen that these aerial elements comprise—

1. Embarked planes designed for direct or indirect attack on the floating enemy. They must be assimilated as an arm of the ships of war. They contribute to obtaining control of the surface.

2. Independent high-seas planes, based on the coast, that have a rôle specifically naval. They must be considered as a true flying naval force. They contribute equally to obtaining control of the surface.

3. Embarked pursuit planes (hydravions-destroyers for example) designed for the destruction of enemy aerial forces at sea. This is the essential element of control of the air over the sea.

Which of these three categories can be considered as "the auxiliary" of other naval forces? Which of them can be separated from it, to be united with the "independent" air forces so dear to General Douhet? Such classification becomes artificial if one envisions the full development of naval aeronautics. It seems more logical to admit that all these aerial forces belong naturally to the composition of a modern naval force. In a modern fleet there should be the flying units, as well as the floating and submerged units. Let us note that the diverse naval elements are always grouped about the unit that possesses the maximum of offensive power united with considerable defensive qualities. In the present state of technique, this unit seems still to be a ship capable of furnishing a solid and stable platform for artillery of large caliber, a surface ship protected against all the modern engines, aerial or submarine, and, accordingly, of a considerable tonnage. It is this powerful unit which forms the necessary backbone of a complex naval force consisting of a large proportion of light units.

Such is the modern fleet, from which the aerial forces can not be separated from the surface and subsurface forces. The rapidity of action of the one, so fleeting, must be sustained by the endurance of the others. "Naval power means an amalgamation of sea power and air power." This is the coming definition of naval power.

X

If, following the theorists of aerial warfare, we have anticipated a little in the near future, we have avoided venturing into Utopia. We have taken as our point of departure the aerial combat, the keystone of all the doctrine of aerial warfare. Our extrapolations have been deduced as logically as possible from the technical realities which seem to be nearly established at the present time. We acknowledge that the pursuit planes are too lightly armed in comparison with the great modern airplanes, but we believe that their actual offensive qualities can be and should be considerably developed, and that, therefore, it remains the principal type of combat plane. It will remain as such as long as it is practically impossible to construct armored planes.

The favorite axiom of the theory of aerial warfare is that the airplane is a weapon of offense without equal. We have seen that this principle can have as a corollary: "The essentially offensive aircraft is, against an aerial danger, the most efficient antidote." It seems to us a dangerous illusion to attempt to build up a theory

of war in the enemy territory and against the adverse marine forces while seeking to elude aerial combat, and avoiding the prime necessity, the destruction of the organized aviation of the enemy. Would one fall again, in spite of the affirmations of General Douhet, into the military errors of the eighteenth century, when it was believed possible to attack the coasts of the enemy, to annihilate his commerce, while avoiding naval errors renewed from 1915 to 1917 by the British air forces, who, in their passion to bomb beyond the German front, disregarded the enemy air forces. Numerous were the planes that fell under the bullets of the first German pursuit planes. The bomb attack on the enemy air bases did not dispense with the necessity of facing an aerial combat. In that which concerns aero-naval operations, it seems that the theories of aerial warfare, such as are preconized by the partisans of the independent air force, are not applicable. These theories are verified in case of warfare over a territory provided with fixed and permanent aviation bases, for, in this case, control of the air becomes a separate objective, the primary objective of an air force organized independently, but which retains the land characteristics. On the sea, where the aviation bases are essentially mobile floating bases, war in the air finds itself inseparable from war for control of the sea. It is always thus when one passes beyond the range of action of combat planes based on the coasts, and this range of action seems to be extremely limited for some time to come.

Along a coast line, in restricted waters, rich in coastal bases—as in certain cases in the maritime zones of Europe—the character of aerial warfare over land may be conserved, and the aerial power may be developed without the direct aid of the naval power. But at large, and as is more generally the case, all important operations are impossible without surface ships, and the war in the air is completely incorporated in the naval war. The offensive in the air can be aided only by a solid structure at the surface. We fall nearly in accord with General Douhet when he concludes, "Resistere sulla superficie per far massa nell 'aria," a formula that we do not interpret, as he does himself, by "offensive aviation in numbers and a defensive Navy," but more logically thus, "Solid surface ships, able to resist a naval combat, are, at sea, an indispensable condition for a massed offensive of the essentially light units that are the combat planes." A principle that is already verified. It is, perhaps, to the formidable flight of American naval aviation that one owes, in this century of speed, the recent conception of the "Percival battleship," the tortoise ship. With us, to a period of penury of naval aeronautic material corresponds the appearance of a fleet of light

surface units devoid of protection. Meanwhile it is true that the naval airplane will become the light unit par excellence of the future naval forces.

Let us finish with a concrete example:

Suppose that in the course of a future conflict the country deprived of the use of the sea attempts a direct attack on the sea communication routes of its enemy by means of airplanes having long ranges of action, hydravion cruisers, for example, able to destroy, directly, commercial vessels. This destruction, without care for the safety of the noncombatant personnel that is imposed by international law, can be envisaged, without doubt, only by a State that has decided to discard the most sacred obligations. In such a case the only efficient protection for this aerial blockade, comparable to the German submarine warfare, would be with a system of convoys, with a strong force of combat planes embarked, with many powerful pursuit planes carried by aircraft carriers, cruisers, and destroyer leaders. These superoffensive aerial destroyers, always ready for pursuit, would quickly chastise these vulnerable aeromaritime corsairs. Who holds the surface zone of the sea is able to clear the sky above.

To hold the surface of the sea: The theorists of aerial warfare, who are nearly always former generals of the army (Mitchell, Douhet) generally reason relative to conditions of warfare above a territory, and lose sight of this absolute necessity. That is why, at sea, besides the combat aviation, the other aviation forces, embarked or independent, those charged with the attack of the floating enemy, that is to say, those operating indirectly to obtain control of the surface, can not be " useless, dangerous, or superfluous."

THE INFLUENCE OF THE AIR ARM ON NAVAL OPERATIONS AND NAVAL TACTICS [1]

Prize Essay for 1930

By Capt. Paul Oswald, retired

[Translated from Marine-Rundschau, February, 1931]

THE RELATION OF THE AIR ARM TO THE WARSHIP

In order to obtain an idea of the influence which the air arm is able to exert and will exert on naval operations and naval tactics, it seems advisable to first make a general outline of the capabilities and limitations of airplanes that can be used at sea. These limitations are either drawn by the laws of nature, or they are based on the nature of the arm itself, or science is unable to overcome them.

The following comparison proposes to give a general idea of the capabilities and the limitations of the airplane in various fields of operation.

Capability.—(*a*) The air arm possesses great power of destruction. It can disable and destroy warships by direct attack. By means of repeated bomb and gas attacks it can render useless important strategic points of the enemy, such as harbors and bases, docks, depots, unloading and loading facilities, electrical plants and waterworks, and also temporarily drive away the occupants.

Limitation.—(*a*) It can neither capture nor occupy points of strategical importance, neither can it establish such points—for instance, bases.

Capability.—(*b*) Only the air arm, that is to say the airplane, is able to achieve that degree of superiority in the air without which operations at sea can not be carried out in future. It is impossible for any naval power to secure "freedom of action" at all points of the sea solely by means of antiaircraft guns.

Limitation.—(*b*) Supremacy in the air is always only temporary and very local. It must constantly be reconquered until the enemy air forces have been completely annihilated, because in the air there are no strategic points from which the supremacy could be exercised.

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[1] The views developed in this essay partly coincide with the statements of the French Admiral Castex in his work Strategical Theories. However, his book, which appeared in the fall of 1929, was unknown to the author when he wrote the present article.

Capability.—(*c*) In consequence of the greatly increased field of view at considerable altitudes above the sea the airplane is able to accomplish extraordinary things in the way of scouting. At an advantage by reason of its very great speed, an airplane in several hours can search areas which it would take a scouting line of several vessels a whole day to patrol.

Limitation.—(*c*) The scouting efficiency is limited by the cruising radius, the opposition of the enemy, the wind and weather conditions, especially the visibility. In a dark night scouting is not possible. In clear nights, too, the capabilities of airplanes are no greater than those of vessels.

Capability.—(*d*) The airplane can start from its airport or from an airplane carrier, stop occasional enemy or neutral merchant vessels, and cause the crews to leave the ship by threats of destruction. It can also sink abandoned vessels.

Limitation.—(*d*) But it is unable to carry on a regular war on commerce because it can not search the vessels stopped. Its crew is also not sufficiently numerous to bring the prizes into home ports, and it also has no facilities to accommodate the crews and passengers of vessels to be sunk.

Capability.—(*e*) Merchant ships and also convoys may be escorted by airplanes from their ports or bases for some distance at sea and incoming vessels may be picked up at appointed meeting places and escorted to the port of destination. Hostile commerce destroyers may be attacked and driven away.

Limitation.—(*e*) However, it is impossible for airplanes to patrol the trade routes on the ocean or to escort convoys over great distances. It would be impossible even if they should have a sufficient radius of action for crossing the distance once. The low speed of the merchant vessels and the high speed of the airplane would make it necessary for the airplane to cover the distance from the port of departure to the port of destination about ten times.

Capability.—(*f*) Most of the types of planes now in use are able to fly the required distance, but the time which they can remain in the air, the endurance, in the case of most types, is not sufficient. The fast pursuit planes are obliged to refuel after only a few hours.

Limitation.—(*f*) In contrast with ocean vessels, in the case of airplanes, when the size of the craft is increased the useful load, namely, the amount of fuel and consequently the endurance, increases in a very unfavorable ratio. Increasing the dimensions in most cases involves lowering the speed.

Capability.—(*g*) Float machines are able to land on the surface of the sea when there is some swell and are able to rise again. Some of the more recent flying boats are also able to accomplish this under

somewhat more difficult circumstances. They may, therefore, be called "seaworthy in a limited sense."

Limitation.—(*g*) But no aircraft is "seaworthy" compared to a vessel. On the water even the largest plane is vulnerable and is suited neither for attack nor defense. Any warship, even the smallest, is superior to it. Water is to the airplane an alien element. However, since it can not live in the air alone and water is indispensable to it, a certain amount of weight must be sacrificed in order to obtain sufficient seaworthiness.

Capability.—(*h*) It is quite possible with airplanes to lay single mines at especially important points or to have a corresponding number of mines laid by a squadron.

Limitation.—(*h*) It is, however, impossible to block a wide fairway with airplanes alone or to lay extensive mine fields, which have strategic value.

This comparison, which lays no claim to completeness, should serve to show that the airplane in many spheres of naval warfare is able to accomplish very much that may be expected to have important consequences. In no sphere, however, with the possible exception of day scouting and in the destruction of land establishments, does its capability equal that of warships. The airplane is not a substitute for the ship either now or in the future. The limitations may become less pronounced, but they will remain, for they are elemental in nature. Technical ingenuity can not easily bridge over the differences between the elements—water and air. The "flying warship" will never be built and the airplane on the water will always be an imperfect craft. Another question is whether the attacking power and the destructive power of the airplane in the course of time can be increased to such a degree that the air arm without the cooperation of a fleet will be able to destroy the nucleus of the enemy's naval power—the superdreadnoughts—and in this way become the means for attaining naval supremacy. Whether this may be expected and to what extent will be shown in the following.

With this end in view, it seems advisable to proceed as follows: First, the principal spheres of action of the air arm will be considered more closely, and from the probable successes to be achieved deductions will be made as to what effect a new arm will have on naval tactics. In this way we shall obtain a basis for an investigation as to how far strategy will be influenced by the air arm in future naval wars.

AIR SUPREMACY IN NAVAL WARFARE

In order to express the idea of air supremacy lengthy definitions have been invented, which need not be reproduced here. It would seem to be more important than explaining what air supremacy is to

show what purposes it serves and in what relation it stands to operations at sea. Air supremacy—unlike naval supremacy—is not an end in itself. The struggle for air supremacy has no other purpose than to secure freedom of action on the sea. This struggle, therefore, is only one of the various means of gaining naval supremacy. It is true, at present and in future, it is one of the most important means. Supremacy in the air has been attained when your opponent by means of his air forces is unable to interfere with your plans at sea.

For successfully carrying out certain undertakings at sea an almost complete domination of the air would be necessary, at least for a certain length of time; for instance, in operations against the enemy coast. For other operations, on the other hand, it will be sufficient to secure an adequate superiority in the air, or at least a balance of power.

It would be incorrect to imagine the struggle for air supremacy as a separate battle, for such a battle would be senseless if it did not stand in some causitive relation to contemplated naval operations. It is true the struggle for air supremacy may and will in certain cases precede the operations at sea. At other times again it will be fought out simultaneously with the latter. The distance separating nations at war will have a great influence on the duration of these battles. If they are neighbors or at least near enough with respect to their advanced bases that the radius of action of the airplanes is sufficient for reaching the adversary and returning, the combatants will seek to annihilate the hostile air forces by destroying the enemy's airports and sheds with bombs. Success is more rapidly attainable in this way and with fewer losses than by fighting in the air.

However, in a war extending over wide sea areas the enemy air power can not be damaged or destroyed in this way prior to the actual operations at sea, because there is no base which the planes of the assailant can operate. Such a base must first be established. It would be a grave error to suppose that the airplane carriers themselves could serve as bases for any length of time. These for the most part enormous and cumbersome vessels are the most vulnerable points of a modern navy. They are a necessary evil and will be a source of constant anxiety for the commander of the fleet. They carry an important part of his fighting forces, but are themselves very vulnerable. Even a slight list prevents the airplanes from landing. For this reason the airplane carriers will be the first and most desirable targets for enemy air attacks and for submarine and torpedo boat operations. The establishment of a base as the first war aim will require the employment of a large number of transports,

ammunition carriers, and repair ships, for the protection of which it may be necessary to use the whole battle fleet. An undertaking of this kind on a grand scale will be accompanied by fighting in the air, which will merely serve to insure the necessary freedom of movement in the air and will only prepare the scene for the struggle for a higher degree of air superiority. Air supremacy will usually be localized, because, owing to the great speed of the airplanes, fresh air forces from other parts of the hostile country can be summoned in a short time to replace the losses. Also, it must not be supposed that superiority in the air once gained will be of long duration. The current types of planes can be manufactured in so short a time that the replacement of losses will probably be more a question of training the personnnel than of replacing the material.

The lesson to be drawn from these reflections is that any superiority in the air once obtained must be immediately exploited in the form of operations at sea, if the sacrifices made are not to be in vain and that whenever it is not possible to take immediate advantage of the situation, it would be a mistake to employ valuable forces in fighting for it.

THE ATTACK FROM THE AIR

1. THE BOMB ATTACK

During the World War, owing to their slight penetrative power and bursting effect, the bombs dropped from airplanes on vessels were much too small to do any damage to armored ships. Thus, for instance, the battle cruiser *Goeben*, which had run aground in the Dardanelles, was bombed for days by enemy airmen without receiving any injury worth mentioning. It is impossible therefore to speak of a war experience with bombs used against warships. It was not until after the war that experiments were made which enabled us to obtain a pretty clear idea of the prospects of bomb attacks from the air and their effectiveness against ships. In the United States, in England, and France extensive tests have been made with bomb dropping on target ships and vessels which had been scrapped but which were decidedly not obsolete. Two different tests were made:

(*a*) Practice bombs were thrown from great altitudes on moving target ships in order to determine the probable percentage of hits.

(*b*) Genuine bursting bombs of different weights were dropped on stationary targets in order to test the penetrative power and bursting effect on the fighting efficiency and buoyancy of the ships.

THE PROBABLE PERCENTAGE OF HITS

In the tests the minimum altitude from which bomb attacks will be made in action was assumed to be about 2,400 meters (8,000

feet). It has been calculated that from this altitude the probability of hitting is 3 per cent and 10 per cent. These figures are explained as follows: 3 per cent represents the actual hits, while 10 per cent is the number of hits which strike so near to the target that there is danger of seriously damaging the ship's side under water. Modern airplanes carry as many as three of the heaviest bombs. In order to obtain at least one effective hit the airplane formation must consist of not less than 10 planes. Taking into consideration that casualties may occur during the advance and during the attack itself, a unit of 15 planes in a V-shaped formation will be the most suitable for establishing a bombing zone which is sufficiently wide and sufficiently deep.

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If these attacks are staged from altitudes greater than 2,400 meters, the antiaircraft defense as well as the opposition of pursuit planes, which first have to climb to the altitude of attack, becomes more difficult. On the other hand the probable percentage of hits for bomb dropping is reduced.

A new type of bomb attack, which is still in the stage of development, is the "dive bombing" attack. The airplanes do not attack collectively and in formation, but individually. From a great altitude the pilot dives his plane almost vertically down on the enemy vessel, releases the bomb about 1,000 meters above the target, pulls the plane out of the dive and trys to escape. The bomb, which has received a considerable initial velocity through the dive, needs only a few more seconds to fall before striking the target. In such an attack the chances of hitting appear to be not inconsiderably increased as compared to ordinary bomb dropping. Now it has been established that airplanes can be built which can stand enormous strain of the dive, attacks of this kind by dive bombers may be anticipated in the future.

THE EFFECT

The bombing trials held in the years 1920 to 1926 were carried out against battleships of various types of construction which included also vessels that were quite new, as for instance the *Washington*, which has a displacement of 33,000 tons. The sinking trials against the *Ostfriesland* in 1920 led to the conclusion that bombs

which miss their mark and drop in the immediate vicinity of the vessel are more dangerous than direct hits, because these bombs do greater damage to the submerged part of the hull. The trials against the *New Jersey* and the *Virginia* have shown, however, that this does not apply in all cases. A 500-kilogram bomb dropped on the *Virginia* from an altitude of 900 meters pierced the entire vessel to the bottom. The masts, funnels and the bridge were torn away and the vessel sank 18 minutes after being damaged by a second bomb of the same type. On the *Washington* three bombs, each having an explosive charge of 450 kilograms, were exploded at the ship's side at a distance at which, according to previous experience, a devastating effect was anticipated. It did not have this effect, however. According to the opinion of the trial board the vessel could still have reached port under her own steam, although she would have had to leave the fighting line. As a result of the strong vibration the rivets of the oil bunkers had burst so that the oil escaped and became mixed with the feed water. The boilers and engines themselves had suffered little.

In order to test the effect of armor-piercing projectiles, which were dropped from airplanes, 35.6-centimeter shells of 650 kilograms were dropped on the *Washington* from an altitude of 1,200 meters. In contrast with the trials against the *Virginia*, a vessel more than 20 years older, the armored deck was not pierced. In the case of release from a greater height, this would have occurred, however.

This and numerous other trials showed that even 900-kilogram bombs would not be very effective against superdreadnoughts. In the United States the weight of airplane bombs has therefore been increased to 1,800 kilograms with a bursting charge. These bombs, it is true, of the very heaviest caliber, if striking in the immediate vicinity of the ship's side, may be expected to disable or sink a superdreadnought.

The question whether it is possible to meet the attack of a bombing squadron by executing a dodging maneuver can be answered theoretically at least. With the help of instruments it is possible to determine to a second the exact moment at which the bombing squadron must drop its bombs, when the principles of aiming have been accurately determined. If the attack is made from an altitude of 3,000 meters, the time required by the bombs to fall is so short that the attacked vessel is unable to alter her course or her speed before the bomb strikes. Therefore, it is impossible to dodge. However, conditions for the vessel are the more favorable the higher the altitude of the attacking planes. At an altitude of 4,000 meters it takes the bombs 28.5 seconds to fall; at an altitude of 5,000 meters the time is 33 seconds. If the menaced vessel, when it is obvious that she is

being attacked by an enemy bombing squadron, disregarding the effect of her own guns, dodges with all the means at her disposal and begins the maneuver a few minutes in advance of the drop, it is not entirely impossible that she may succeed in getting beyond the range of the bombing zone. An airplane squadron, which has thrown its bombs, but has failed, can only undertake a second attack when the airplanes have received a fresh supply of ammunition. This will require hours, provided the equipment at sea by an airplane carrier is possible at all. It is more probable, however, that in a naval action, which, as experience has shown, is fought under high ship speeds, there will hardly be an opportunity for a fresh equipment of the bombing squadron. The attacks of dive bombers must be regarded as much more dangerous to ships, for it hardly seems possible to dodge the headlong and yet controlled dive of the plane and the fall of the bomb taking only a few seconds.

2. THE ATTACK WITH TORPEDO PLANES

The idea of using airplanes to carry torpedoes to enemy vessels and to drop them on the target at short range was evolved in England before the war and was actually applied in the course of the war—also on the German side. However, the practical solution of this apparently so simple technical problem has turned out to be extremely difficult and the success achieved on both sides was only moderate. Airplanes and engines at that time were not strong enough to stand the strain and to carry the very heavy torpedoes. But the real underlying cause of the many failures was not the airplane and its crew, but the torpedo, whose ballistic properties were not yet completely controlled. For example, in a German submarine operation all four of the bombs dropped went to the bottom. On the German side a total of 11 torpedo plane operations were carried out, 28 torpedoes were dropped, and 6 hits were recorded. The British, too, had no better luck, although they had had longer experience and almost unlimited means at their disposal for making trials. However, speculations as to the future prospects of torpedo attack by airplane should not be based on experience which is 13 years old, because for the difficult problems of that time satisfactory solutions have been found long since. Reliable torpedo planes of various types of construction are available. Planes with flotation gear, which start from the water, and planes with wheel-type landing gear, which can take off from the deck of airplane carriers. Their speed may be estimated at 150 to 180 kilometers per hour. Their endurance amounts to five hours.

A simultaneous attack by several torpedo planes, even when made on a target which does not try to meet the attack with antiaircraft

guns, will require highly trained pilots and gunners, who have had much practice and who are thoroughly versed in tactics. The attacked vessel will open direct fire on the planes not only with her antiaircraft guns but with all the guns at her disposal, and will create at a distance of about 1,000 meters a barrage of projectile splashes in which the airplanes would immediately come to grief. The time during which the airplanes must fly through the danger zone of 4,000 meters until the shot is fired is only short. It is about 1½ minutes. In spite of this short period of danger it will require unshakeable courage and great skill to approach near enough to a fire-spitting superdreadnought to fire an aimed torpedo. The efficiency of torpedo planes in action will depend less on the technical difficulties than on the limits of human capacity.

Speculations as to which mode of attack—with bombs or torpedoes—is most effective or most dangerous for the warship might justify the following conclusions: Bombs are inexpensive, simple in construction, can be manufactured quickly and are reliable under all circumstances. Torpedoes, on the other hand, are extremely complicated and must be handled with great care and ability. If this is done, however, torpedoes may also be considered reliable. The effects of bombs and torpedoes may be regarded as equal. The results obtained by the bomb through a larger amount of explosive are obtained by the torpedo because its point of detonation is always favorably located in the immediate vicinity of the ship's side.

In an ordinary bomb attack from a high altitude the airplanes are not greatly endangered by antiaircraft guns and pursuit planes, although casualties must be anticipated of course. Of the bombs dropped by a squadron, one, and under the most favorable circumstances two, will hit the target. The others must necessarily fall into the water without doing any damage. For the dive bomber, however, the probability of hits is rather favorable because in bombing, errors in aiming and in calculation will hardly be of consequence owing to the brief period of fall. Torpedo planes when making an attack are undoubtedly in greater danger than a bombing squadron at a high altitude, and heavy losses are to be expected. But the probability of hits is just as favorable as in the case of the dive bomber. The torpedoes might *all* hit, for all shots are aimed and there is no absolute necessity that a part of them should miss their mark. The torpedo attack is, however, subject to two limitations. Torpedo planes can attack only when there is a sufficient area of attack and the water is not too shallow for firing torpedoes. In shallow and narrow harbors a torpedo attack is out of the question, while for the bomb attack limitations of space simply do not exist. A further limitation is imposed by the night. When the night is not very clear or when

the night is dark the outlines of another vessel may still be observed from on board ship as a dark mass silhouetted against the lighter horizon, while the crew of an airplane can only see impenetrable darkness beneath. At night torpedo planes can operate at sea only when it is unusually clear.

SCOUTING

(a) *Tactical reconnaissance and service of protection.*—From the lookout of a ship at height of eye of 25 meters the radius of the field of observation up to the horizon when the visibility is unrestricted amounts to 10.5 nautical miles. The surveyable surface of the sea comprises 301 square nautical miles. The observer in an airplane at an altitude of 600 meters—theoretically at least—surveys the horizon at a distance of 51 nautical miles. The observation area has been increased to 8,063 square nautical miles. Airplanes can climb to much greater heights, of course, and the distance of the horizon also increases, though at a slighter rate. It is unnecessary, however, to consider still greater areas, since the conditions of visibility at sea rarely permit a craft to be perceived at a distance of more than 50 nautical miles. However, the figures mentioned sufficiently demonstrate the great superiority of an airplane over a vessel in scouting. From a single plane, therefore, an area can be surveyed which it would take a line of from five to six cruisers to reconnoiter. This capacity may be utilized in two ways. Airplanes can either be used for scouting and protection duties, which were formerly performed by cruisers, and the cruisers thus released can be used at another point or saved for other purposes, or an insufficient number of cruisers for scouting puposes could be supplemented by airplanes. Of at least equal importance in the conduct of the war at sea is the great speed of the airplane. Thanks to this attribute, it is possible during the light of one day to reconnoiter in the direction of the enemy at distances which are hardly slighter than the 24-hour run of a fleet at the highest imaginable cruising speed. If we assume, for example, 15 hours of daylight and 9 hours of darkness, a cruising fleet could cover:

15—22= 330 n. m. in daytime and
9—18= 162 n. m. at night

Total 492 n. m.

The long-distance scouting planes reconnoiter 475 nautical miles during an outflight and return flight, each lasting 5 hours, at a speed of 95 knots. This example will show that in future it will hardly be possible any more for an assailant to take advantage of

the night in order to appear unexpectedly in the morning at some desired point. If the port of departure should lie more than a night's cruise from the destination (more than 200 nautical miles) the approach would be discovered by the airplanes of the defender already during the preceding day. The air arm, it is true, will not eliminate an important element of naval warfare—the surprise—but it will doubtless make it very difficult. The air arm has changed conditions in this respect in favor of the defense.

The defender, being able to sight the adversary promptly, will be in a position to select the most favorable time and place for encountering the enemy. He can avail himself of the opportunity to draw his forces together to advance submarine lines or lay tactical mine barrages right across the enemy's path with his fleet occupying a position which will permit him to take advantage of the light, the wind, and the sea.

The capabilities of the air arm in scouting are, however, not unlimited. In the first place they are limited by the period of daylight, for at night the efficiency of airplanes is below that of vessels. The observation from the airplane is handicapped by the strong draft. For example, it is hardly possible to use binoculars for scanning the horizon. When the light diminishes, the advantages of airplane scouting are reduced, and at night conditions change in favor of vessels. The natural phenomena, too, which have an influence on visibility, such as rain and snowfall, are more detrimental to the airplane than to vessels. Strong wind has the same effect. In using airplanes for scouting it should never be forgotten that this service makes much greater demands upon the endurance of the small crew than on the crew of a cruiser and that the crew of an airplane must have sufficient rest in order to remain efficient.

(*b*) *Strategical reconnaissance.*—In the World War, during operations in the North Sea, submarines were frequently used with success for strategical reconnaissance both by the Germans and the British. In contrast to the surface vessels, they had the advantage that they could remain for days in the enemy coastal waters, usually invisible and almost invulnerable, observing the traffic. The only thing which prevented them from carrying on strategical reconnaissance in perfect form was their slight height of eye which did not permit them to make a direct inspection of concealed harbors. In future this defect, too, will be abolished with the help of the air arm. Years ago submarines were built which could carry on deck a small plane in a pressure-proof container. Invisible to the adversary, the plane is brought over wide sea spaces to the vicinity of the enemy coast and, as it were, rising from the sea, it increases the submarine's altitude of observation according to requirements. By direct obser-

vation the airplane can determine the presence and strength of enemy forces in the harbors more quickly and more accurately than could the submarine by observing the traffic for days. Such cooperation between submarine and airplane constitutes a very powerful and promising form of strategical reconnaissance. Warlike operations at sea in the future will have to be conducted always from the standpoint that it is no longer possible to conceal the movements of vessels during the period of daylight, even when the main body of the enemy is very far away. Only the darkness of night still affords a possibility of moving naval forces unobserved by the enemy.

THE INFLUENCE OF THE AIR ARM ON NAVAL OPERATIONS AND NAVAL TACTICS

Prize Essay for 1930

By Capt. Paul Oswald, retired

(*Conclusion*)

[Translated from Marine-Rundschau, March, 1931]

There is a general tendency to form incorrect and for the most part exaggerated ideas about the number of airplanes which are used in an undertaking over the sea and to overestimate the danger threatening from the air. An example shall show the number of planes to be reckoned with under certain circumstances. Let us assume that two of the strongest naval powers are involved in a naval war and that up to the outbreak of hostilities both sides had adhered to the Washington treaty; that is to say, the limitations imposed in regard to total aircraft carrier tonnage had not been exceeded. Let us also assume the not improbable circumstance that the adversaries are separated by an ocean. The attacking fleet, in order to make contact with the enemy, would have to go so far away from its own shores that its long-distance scouting planes, which can not be carried on ships on account of their size, would be eliminated because their endurance is not sufficient for crossing the ocean. Under these circumstances the assailant has to rely on the airplanes which can be carried on aircraft carriers and warships. Without counting the unassembled reserve material, and considering only the airplanes which are ready for flight, the following craft are available:

Carried on aircraft carriers, about 322 planes.

Carried on warships (assuming that all battleships are able to launch 2 planes, respectively, and battle cruisers 1 plane, an assumption which at the present time is not yet correct), 78 planes.

Total, 400 planes.

According to the purpose for which used they are made up about as follows: The planes carried by the battleships may only be of light construction because they have to be launched by catapults. Therefore, they can be used only for pursuit, for gun spotting, and for tactical short-distance reconnaissance—that is to say, they are not used for direct attack. A part of the airplanes carried by the air-

plane carriers (about $\frac{1}{3}=100$) will also consist of pursuit planes, while the greater part ($\frac{2}{3}=220$) will be composed of attacking planes. It may be assumed that of the latter a part (about 70) will be used for long-distance reconnaissance, the balance of 150 thus being available as explosive carriers. Depending on the weather, the cloudiness, and prospective targets, the attacking planes will be equipped with bombs or torpedoes. Consequently it is these last-named 150 planes which directly menace the enemy fleet, while 110 planes will only injure the enemy indirectly by scouting and gun spotting and 140 will be employed in self-defense.

It is true, conditions will change if both fleets move within the cruising radius of the long-distance scouting planes. In that case a part of the planes previously used for scouting will be available for other purposes and will serve to increase the attacking squadron. But also under these conditions very great changes in the numbers will hardly occur. If a fleet can rely on only a part of the air arm which it carries on aircraft carriers and warships, in order to employ the arm it must put up with repeated and long delays while under way.

Theoretically it takes an airplane but a few minutes to start from the deck of an airplane carrier, but the latter must first turn head to wind, and for this purpose the vessel is usually obliged to sheer out of the course which the unit is pursuing and if necessary even take the opposite course. The landing of a plane returning to its carrier will take longer. It will be from 5 to 10 minutes before the aircraft carrier, which has turned into the wind, has resumed its proper course. If, during this maneuver, the other vessels have continued on their course at a cruising speed of 15 knots, the carrier in the meantime will already be separated from its unit by a distance of 2.5 nautical miles.

Some idea may be formed of what the situation will be in the case of an operation lasting several days, during which it is expected that contact will be made with the adversary. During the period of daylight the airplane carriers, which, after all, are nothing but floating airports, will be constantly starting and landing planes which are sent out to relieve the scouts, to repel hostile flyers, or to attack, returning after they have performed their duties for the purpose of refueling or on account of trouble. Especially at dawn and at sundown the starting and landing traffic will be very lively. In deploying for battle about 250 planes should be started from 5 or 6 airplane carriers. This maneuver, even if carried out smoothly, will hardly take less than an hour. Much delay will result even if only a few planes fail. In view of these difficulties it need hardly be anticipated that in real warfare all the enemy's available airplanes will actually be employed.

THE INFLUENCE ON TACTICS

Fifteen capital ships, which, when the recently concluded London naval treaty of 1930 goes into effect, will be the foundation on which rests the entire naval strength of the greatest nations, is a basis which is so disproportionately slender that each vessel represents a much greater value than was the case in the time of sailing vessels or even at the time of the World War. Not only is the value of a battleship extremely high, in gold, but, above all, it is relatively high numerically in proportion to the entire battle fleet. This circumstance weighs all the more heavily since the period of construction is several years.

A weapon which has such enormous destructive power as the air arm, therefore, will not remain without influence on tactics at sea. Pursuit planes and antiaircraft guns will not suffice to reduce the air menace to a negligible quantity. *The greater the inferiority of a naval power to an adversary in the air, the greater will be the weaker belligerent's desire to combat the effects of the air arm by tactical measures.* However, the surveyable, never-changing theater of operations presented by the sea makes the methods of naval tactics extremely limited in comparison to war on land. The formations created by the units, the various transitions, the manner of distributing and using the light fighting forces, the utilization of wind, weather, and light, and artificial smoke screens for camouflage and screening, these really constitute all the means at the disposal of naval tacticians for carrying on the battle.

It would be making an impossible demand if an attempt were made to find in a change of tactics a means whereby the influence of the air arm could be eliminated. But it does not appear impossible to somewhat diminish the danger threatening from the air by adjusting tactics to the new weapon without at the same time incurring other serious disadvantages. In any case it will be no mistake if an effort is made, in the treatment of all tactical questions, to take into account the presence of the air arm and to avoid everything that might be of advantage to the hostile army, as far as possible without lessening the effectiveness of your own weapons.

1. FORMATIONS

(*a*) *Fighting formations.*—The most conspicuous characteristic of the air arm is its great mobility, for which a natural antidote may be found by giving the formations of the fleet greater flexibility than they have hitherto possessed. For instance, it will no longer be consistent with present conditions to mass valuable capital ships in closed lines with comparatively slight distances between the vessels, as was

still the custom in the World War. On the contrary, it would seem quite logical to invest formations, which formerly were the most concentrated in action, with a higher degree of flexibility. A loosening process of this kind finds its parallel in land warfare. In our day the guns in a coast or land fortification are no longer arranged in a straight line with absolutely regular intervals, as formerly, but they are distributed as irregularly as possible over a larger area. In like manner it is conceivable that in battle formation vessels are no longer rigidly bound to their position in the wake of the ship next ahead, but only the speed and the course of the flagship sailing in the center of the formation is prescribed, while the other vessels are at liberty in loose formation to deflect laterally from the line of bearing at their own discretion. The distances between the vessels would have to be increased to about 1,000 meters with no obligation to strictly adhere to this distance. The only guiding principle would be for the vessels to avoid screening each other.

It is true that a loose formation of this kind would be more extended than a closed line ahead with only 500-meter intervals between the vessels, and the control from the flagship in some respects would be more difficult than heretofore. However, since the most powerful battle fleet in the world may be composed of only 15 vessels, it may be assumed that the longitudinal extension of the formation will not constitute an obstacle to a firm and efficient control from the flagship. In the battle of Jutland the British line was composed of 27 vessels without counting the battle cruisers.

To compensate for the disadvantage of a more difficult control a looser formation promises a number of important advantages, which in part will also serve to diminish the danger from the air.

1. The individual vessel can be more smoothly and steadily navigated than when it is jammed in a fighting line ahead. Marked changes of course and of battle tactics do not crowd the line.

2. The smoke of funnels and the smoke of guns no longer disturbs the whole line, as heretofore. Each vessel can freely survey the situation.

3. *The individual vessel when in a particularly dangerous situation is able to maneuver freely without being in danger of collision with the next ahead or the next astern.*

4. Vessels especially exposed to and suffering from the effects of enemy guns can be smoke screened without seriously inconveniencing the other ships.

5. Enemy torpedo boat attacks " on the line " are more difficult to carry out and have very much slighter prospects of hitting than on a line ahead with the distances formerly maintained between vessels.

(*b*) *Cruising formation.*—In sea areas which are covered by hostile air scouts it is impossible to remain undiscovered as soon as the

night has vanished. Discovery must be anticipated. It would require a very great superiority in the air to keep off *all* enemy scouting planes so effectively that they can neither observe nor report. The only thing that could perhaps be done and which will, therefore, be attempted is to make the picture obtained by the enemy in air reconnaissance as confused as possible, which would result in inaccurate and conflicting sighting reports. A cruising fleet will not move in strong columns, which may be easily perceived, but will steam in great lateral extensions determined by the prevailing visibility, breaking up into small groups which may even be composed of different classes of ships. The general course will usually be directed toward the destination or a meeting point, but the individual groups will change course as much as possible, temporarily uniting and again breaking up. In short, they will endeavor to obscure the picture.

With an open cruising order it will hardly be possible to form a screenlike protection by means of cruisers because the areas to be protected are too extended. Airplanes will replace the cruisers and protect the fleet against surprise encounters with the opponent. If the visibility diminishes or the weather becomes so bad that protection by airplane has to be abandoned, the enemy will also be obliged to discontinue the air reconaissance. The vessels cruising in separate groups will unite and pass over to protection by cruisers.

2. DISTRIBUTION AND EMPLOYMENT OF TORPEDO-BOAT FORCES IN ACTION

Heretofore it was customary to assign a part of the torpedo-boat forces to the scouting and battle cruisers, while the other part remained with the main body of the fleet for the purpose of protecting the submarines. At the beginning of the battle the destroyers were assembled at both ends of the fighting line and there held in readiness to be launched against the main body of the enemy. In the future naval battles will undoubtedly be fought at as great a distance as visibility will permit and it is very probable that in the daytime the torpedo-boat flotilla will hardly have an opportunity to attack in force. Therefore, it would be a waste of strength if destroyers were in future stationed collectively at the ends of the fighting formation, where they would have to wait vainly for employment. They will be better employed if the flotillas are divided and the destroyers distributed along the formations for the purpose of protecting against airplanes. *Destroyers will also have to be stationed on the engaged side.* They are in no greater danger there than on the unengaged side. It only seems so. The lateral distance from the ships will be from 1,500 to 2,000 meters. It is not only the duty of the destroyers to protect the submarines but to repel the torpedo

planes which break through between the destroyers or have to fly over them in order to attack. Besides, the position of the destroyers on the engaged side of the formation is very favorable, in the event of an attack by enemy torpedo boat forces, for pouncing upon the adversary and interfering with his intentions. If during the action it becomes necessary to make single vessels or sections of the formation temporarily invisible to the adversary by means of smoke screens, the destroyers will be able to produce this smoke without loss of time.

3. SELECTING A FAVORABLE TIME FOR THE BATTLE

A navy inferior to its opponent in the air, by choosing a favorable moment for the battle, is able to bring about a certain equalization of the air forces—not in a strategical sense but in a tactical sense. The commander of the fleet, when it has been reported to him that the enemy fleet has been sighted, could maneuver in such a way that the beginning of the battle would be delayed for an hour or several hours—perhaps even until twilight has set in. The purpose of this measure is to save your own attacking planes until they can be employed in a really profitable manner, while enticing the opponent to a premature deployment of his air forces, and thus tiring out the air arm in advance. For example, the enemy's pursuit planes must land again after a few hours in order to refuel without having had an opportunity to do anything.

An opposite procedure might also be successful. When the first reliable reports are received concerning the presence and the position of the enemy, the fleet could immediately bear down on the enemy at full speed, while the bombing and torpedo planes could be launched simultaneously for an attack on the enemy *airplane carriers*. If you can succeed in disabling or at least seriously damaging these vessels before the adversary has sent out all his planes, such a partial paralyzation of the enemy air arm would justify risking your own attacking planes recklessly.

4. TACTICS IN THE HARBOR

On account of the air menace an entirely new department of naval warfare has been introduced, the development of which required careful attention and detailed consideration. This field may perhaps be designated as "tactics in the harbor," even though it has nothing to do with tactics in the sense of "using the weapons for fighting purposes." We are here concerned with the protection of the weapons until used in actual warfare.

During the World War vessels and fleets were still, generally speaking, entirely safe in their own harbors and on the roads, pro-

tected by mine barrages, coast defenses, and protective forces. Lying in the harbor was synonymous with rest and relaxation from the hardships of the sea. In the future this tranquility and safety no longer exists. On the contrary, stationary vessels will be tempting targets for the bomb attacks of the air arm, and even at night they will not be safe from attack if their position has been reconnoitered in the daytime.

The former practice of simply letting the vessels anchor in the roads or mooring them to buoys in the harbor, will have to be abandoned. Already in time of peace berths will have to be provided and equipped in the vicinity of tall trees or buildings. It will be necessary to make use of camouflage and deception. The berths must be disguised in a manner similar to the coast defences. Old cargo ships and scrapped war vessels will be rigged out as sham warships and distributed among the real warships. However difficult and inconvenient it may be, under especially dangerous circumstances towing maneuvers will be carried out and berths changed in order to mislead air reconnaissance or espionage. In order to give the crews an opportunity to rest, at least during the night, they will be permitted to sleep in bomb-proof dugouts, provided the latter are not needed for antiaircraft defense.

On account of the great dangers to which vessels lying in harbors are exposed owing to the presence of the air arm, it must be considered to what extent roads, rivers, and harbors, which formerly were used as places of refuge and as bases, under present conditions are still suitable at all for such purposes. On account of these considerations the number of bases will doubtless be greatly reduced and many a harbor which is protected against sea and wind will be regarded as unsuitable, while other harbors, which were formerly neglected as bases for warships, will acquire greater importance. We are thinking primarily of the great trading ports, which mostly lie at some distance from the coast and are hard to reach from the sea, but which just for that reason and on account of their greater extent afford better protection against attacks from the air.

THE AIR ARM IN CRUISER WARFARE

The war against the enemy's transoceanic trade could be prosecuted with the greatest economy and with the best prospects of success if it were carried on in areas in which the routes used by merchant vessels converge, as is the case in the vicinity of important points of approach on the coast or in narrow waters. In places where traffic is greatly congested a cruiser operating against commerce could reap a rich harvest if it could manage to remain in these areas for some time without being disturbed. However, since

such focal points always lie near the coast (it makes no difference whether the coast is hostile or neutral territory) the adversary will also pay special attention to these places and take measures to protect the trade. The presence of a cruiser operating against commerce in these areas without being seen or disturbed, therefore, is hardly possible. Commerce destroyers will be obliged to prosecute their war on trade by searching for enemy merchant vessels and enemy cargoes on the high seas. There, on the limitless expanse of ocean, the airplane will render extremely valuable service to the raider, particularly to the submarine cruiser operating against trade, by increasing the cruiser's range of observation fivefold and being able to sight merchant vessels at great distances without being perceived. The experiences of the German auxiliary cruiser *Wolf* in the World War with an airplane which accompanied the vessel were favorable in the highest degree. The plane discovered a number of merchant vessels which otherwise would have escaped. A second important duty which in the future will be performed by the airplane in cruiser warfare will be the protection of the cruiser against being surprised by hostile cruisers engaged in protecting commerce. The plane will be on the lookout for surprise attacks while steamers are being searched, when the vessel is refuelling or taking on provisions, and during other operations which hamper a cruiser's movements.

Naturally the opposition of commerce-protecting cruisers, which are also equipped with airplanes, must be reckoned with. In the case of the commerce-destroying cruiser the danger of being discovered is not inconsiderably increased by the use of airplanes on the part of the enemy. However, assuming the conditions to be the same on both sides, the advantage remains on the side of the cruiser operating against commerce. It is probable that the airplanes on both sides will mutually discover the adversary at so great a distance that the vessels have not yet sighted each other. The cruiser will have more or less of a start and the pursuer must catch up before he can bring the opponent to action. If he does not succeed in doing this before darkness sets in, the pursued vessel has a good chance of escaping under the cover of night. All things considered, the following conclusion will be arrived at: While the air arm is designed to make the chances of success in cruiser warfare more favorable, it is not to be expected that the previous situation will be fundamentally changed and that the prevailing conditions will be revolutionized. The airplane is unable to carry on a war against commerce independently. It will always be only an auxiliary arm and will always require a vessel as a base.

Essentially different and much more complicated will be the conditions when a naval power decides to protect commerce by forming

convoys and using warships to escort them from the ports of departure until their arrival in home waters, and in particular using powerfully armed vessels to protect important shipments of goods or ammunition. It will hardly be possible to conceal the fact that numerous merchant vessels sail from the neutral ports of a continent about the same time. It will soon become known to the enemy. It would not be long before the intention of forming a convoy would be suspected. Of course, at first the enemy would be in ignorance as to the rendezvous and course of the convoy. Nevertheless, he will try to intercept and destroy convoys of this kind, provided this does not interfere with his other war plans. For this purpose he will not despatch a single cruiser, but a cruiser squadron, very probably accompanied by airplane carriers whose speed corresponds with that of the cruisers. Thanks to the enormous scouting radius of airplanes there is a probability that the convoy will be discovered at some point of its long voyage, particularly since there is hardly any doubt as to its final destination. If the reconnaissance is successful the cruisers will seek to make contact with the convoy. At first, however, they will avoid an action and keep beyond the range of the heavy guns of the escorting warships. They will be able to do this on account of their higher speed.

A war situation of this kind under certain circumstances may lead both adversaries to summon stronger and stronger forces and the attempt to escort an especially important convoy may develop into a naval action which neither opponent has planned. As has already been mentioned in discussing other war situations, in such a case the air arm may have the effect of hastening important decisions.

If, after the convoy has been discovered, the assailant does not succeed in bringing the strong escorting forces to action at the right time by the aid of still stronger units, or if the conditions for such an action do not seem favorable, he will undoubtedly employ the planes carried for attacking the convoy and sinking the ships by dropping bombs. Even armed merchant vessels will hardly be able to avoid these attacks, and the escorting warships, although armed with antiaircraft guns, can not prevent the destruction of the convoy.

In view of the extreme danger to which the whole undertaking is exposed by the ruthless employment of the air arm, the military leader of the convoy must consider it his most important duty to destroy the enemy airplane carriers as soon as possible, or at least to prevent them from sending out or receiving planes on board by constantly pursuing the vessels during the period of daylight. Furthermore, these considerations lead to the conclusion that a naval

power which makes use of the convoy system, in the future will have to assign airplane carriers to the warships forming the escort in order to be able to oppose the enemy air arm with any prospect of success.

NAVAL OPERATIONS AGAINST THE ENEMY COAST

The importance of naval operations against the enemy coast line has in no way declined as compared to former times. In wars in which the severing of transoceanic communications by a war on commerce or a blockade does not bring sufficient pressure to bear on the enemy to induce him to make peace, there usually remains no other method, but to occupy the strategic points or his entire country with troops. Important wars of the nineteenth century—such as the Crimean War, the Spanish-American War, and the Russo-Japanese War—could not have been carried on without a landing force. The landing of the Franco-British Army at Gallipoli during the World War might have led to a collapse of the Central Powers as early as the year 1915 if the advance on Constantinople had succeeded. The effects of the air arm on naval operations against the coast may perhaps be most clearly realized by first considering the opposition which the operations will encounter.

The results of the great naval maneuvers of the United States against Hawaii in 1925 may be briefly summarized as follows:

1. The effectiveness of the fire of existing permanent coast defenses is increased two ways by aerial observation: In the first place by increasing the firing distance to the maximum range of the guns, and in the second place by observing the projectile splashes, which can not be observed with the same accuracy by direct observation with optical contrivances.

2. Modern coast defenses with their widely scattered guns are comparatively invulnerable to bombardment and bomb attacks from the sea.

3. If the assailant from the sea has undisputed supremacy in the air and the defender, in consequence, is unable to undertake bomb attacks, etc., against the vessels, the only reliable means of defense which remains is the coast gun.

4. While the absolute resistance of the coast defenses is increased by the air arm, their relative importance has declined because the coast artillery has been pushed into the second line. The first line of defense is now occupied by the bomb attack on vessels.

5. The mobile coast defense has gained considerably in importance due to the airplane. Since the projectile splashes may be observed from the air, attacks on the coast may also be repelled in those sectors in which there are no prepared observation posts.

The assailant attacking from the sea naturally can gain similar advantages for himself by employing the air arm. In the first place, by direct observation from the air and airplane photographs he will obtain a more accurate idea of the defensive works on land than through espionage in time of peace and the reports of agents. Like the defender, the assailant will also be able to take advantage of the maximum range of his guns, in the bombardment of coast defenses, and to have the fire control carried on by the aid of airplanes. However, if the assailant does not possess absolute superiority in the air the advantages resulting from the air arm would clearly be entirely on the side of the defender. Losses suffered by the assailant in air fighting can not be easily replaced, for his arsenals and workshops are at a distance—perhaps a thousand nautical miles or more away. The reserve material which may be taken along oversea is limited. The defender, on the other hand, has all his reserves and workshops close at hand. Losses can be promptly replaced. His strategic lines of communication are short and in no danger.

THE INFLUENCE ON STRATEGY

As far as scientific teachings may serve as a basis for the conduct of war, the lessons of naval warfare may be regarded as almost unshakable and secure, for their truth is demonstrated by the events of naval wars during several centuries. Neither new arms nor technical revolutions on the sea have been able to shake or change these basic principles of strategy. Even the introduction of gun armament on warships and the transition from wind to steam as a means of propulsion have hardly changed the foundations of naval strategy. The most pronounced effects which new weapons on the sea have brought about have only been changes in the methods of naval warfare, and even such changes have only occurred under very special circumstances. If the torpedo arm, for instance, had remained confined to warships and employed merely as an auxiliary weapon a change in tactics would have become apparent but no change in the form of warfare. It was only due to the circumstance that in torpedo boats and submarines the arm became mobile and offensive that it received a different rating. In the same way the mine began to influence the conduct of naval warfare only when it became an offensive weapon in the form of the floating mine. The effectiveness of the torpedo arm and the mine was the primary reason which induced England during the World War to employ the weaker form of naval warfare, the *distant* blockade, in her operations against the German coast. These examples seem to justify the belief that the air arm in the future will exert an especially marked influence on the methods of naval warfare, since it is in the highest degree mobile and also promises to be very effective as an offensive weapon.

In fact, the air arm in the future war at sea will be more effective than any new weapon has ever been. But it need not be anticipated that it will completely revolutionize strategy, for the air arm, as the previous paragraphs tend to show, remains only a weapon in the war on the water. It is true the weapon works in another element—the air—but its effects are felt only on the water or on the land.

1. EFFECT IN SHORTENING WAR

If in a future naval war the comparatively improbable case should occur that both opponents should be desirous of bringing about a decision no matter when and where, the air arm will, in a high degree, contribute to the actual realization of this will to battle in a short time. If the theater of war lies in European or other restricted areas, in the future air operations attending fleet sorties, will scarcely simulate those that occurred in the North Sea during the World War. It will no longer happen that opposing fleets will pass each other or that one fleet learns nothing of the approach of the other. The influence of the air arm, therefore, may have the effect of bringing about a very early decision on the sea, which must be of the greatest importance to the fate of nations. Under certain circumstances it may have the effect of greatly shortening the war.

2. MEANS OF EXERTING PRESSURE TO BRING ABOUT A DECISIVE BATTLE

If one of the adversaries for a certain length of time considers a strategical defensive to his advantage, he will at first try to avoid a decisive battle and will keep back his squadron in fortified bases. In such a case it was formerly impossible for the assailant to force the enemy fleet to decisive action by means similar to those employed on land. For this purpose he either had to have an army, which captured the base from the land, or other strategical means of exerting pressure in order to force the adversary to abandon his aloofness. In the last war the means employed to this end were blockade, attack on enemy trade, bombardment of the coast, and operations threatening lines of communication.

In future a new and formidable means of exerting pressure—the air arm—will be added. The assailant will attack the hostile bases and warships from the air until the enemy is forced to decisive action. The air arm, therefore, in case one of the belligerents attempts to put off decisive action, may help to counteract this tendency.

3. INFLUENCE ON THE PLAN OF CONCENTRATION

In discussing the influence of the air arm on tactics it has already been pointed out that the above-mentioned danger which threatens

the bases must be fully taken into account in making the plan of operations. If it becomes apparent that certain naval ports are within easy reach of the enemy air arm but can not be sufficiently protected by your own air forces because of inferiority in the air, they will be abandoned and the war will be carried on from ports lying at a greater distance. Even if these ports are more protected against attacks from the air, the conduct of the war will be unfavorably affected, nevertheless, for the approaches will be farther and the lines of communication longer. In some cases abandonment of the bases in the greatest danger will even necessitate the surrender of naval supremacy in specific areas. In any case, however, the influence of the air arm will make naval warfare more varied and more complicated in the future than it was in the past. Future war plans will have to be thought out all the more carefully and both the material and intellectual preparations for war will have to be made with greater care in order to prevent a more strongly armed and better prepared opponent from inflicting losses at the very outset which in the course of a short war could not be replaced.

4. ABANDONMENT OF THE CLOSE BLOCKADE AS A MEANS OF NAVAL WARFARE

Influenced by the dangers which threatened them from submarines, torpedo boats and mines in the German Bight, the British during the World War, in spite of the numerical superiority of their fleet, failed to attack coast places and did not attempt a close blockade of rivers. The air arm, which is suitable for strengthening the position of an adversary who has adopted the strategical defensive on the sea, has the same effect as the above-mentioned submarine weapons of naval warfare, but in a higher degree. In so far as a power attacking on the sea has to reckon with any hostile air force at all, the assailant will hardly decide on a prolonged stay in hostile waters for purposes of blockade. It is only against nations which have no air force, like Germany, that a close blockade could still be maintained in the future. In a war between two powers possessing a complete naval armament, including an adequate air arm, this method of naval warfare will hardly again be employed. Arguments in favor of a close blockade have lost much of their force since the outcome of the war against the Central Powers has clearly demonstrated that a distant blockade is just as effective as a close one, provided the blockader takes complete advantage of his position of naval supremacy. Another very sound reason for not in the future using the close blockade as an instrument of naval warfare is that the air arm itself favors the employment of the distant blockade, since it is more suitable than any other for effectively guarding extensive sea areas.

EXPLOITING THE WEAKNESS OF THE AIR ARM

The natural obstacles, which seriously handicap the air arm in the performance of its duties, are the darkness of night and bad weather. The effectiveness of airplanes is greatly reduced by weather conditions which do not affect the seaworthiness and fighting efficiency of vessels.

A warring naval power, which is greatly inferior to its adversary in the air but does not allow this advantage to influence its aggressive spirit, will try to profit by the weakness of the air arm. It will take advantage of seasons with unfavorable weather conditions and long nights for carrying out operations. In the construction of vessels and craft it will insist upon a high degree of seaworthiness and will transform the personnel, by an efficient and strenuous peace training, into weather-hardened crews accustomed to the sea.

VIEWS OF ITALY'S MINISTER FOR AERONAUTICS

Résumé of and extracts from the speech made by Gen. Italo Balbo, Minister of Aeronautics, on April 29, 1931, before the Chamber of Deputies in connection with the aeronautical budget for fiscal year beginning July 1, 1931

FINANCIAL

Financial means have not been sensibly augmented. The aeronautical budget has been practically the same for the last four years. All the recommendations of the finance committee will be fully considered, but one of the things that appeared to be most urgent was that of most strict economy under the heading of " Extraordinaries." It is hoped that the Ministry of Finance will take into account the particular necessity for Italian aviation to possess a complete ground organization, without which aviation is not possible, and to calculate, as was only just, these extraordinary expenses absolutely apart from any ordinary expenses in the budget, as is done in the case of the budget for the Royal Navy.

CIVIL AVIATION

Italian civil aviation has extended over a network of 16,249 kilometers (10,097 miles). In 1930 the number of kilometers flown was eight times greater than in 1926; the number of passengers ten times greater; the mail carried increased from 1,500 kilograms (3,307.5 pounds) to 68,000 kilograms (149,940 pounds) and the transport of merchandise increased from 40,000 kilograms (88,200 pounds) to 612,000 kilograms (1,349,460 pounds).

Within the last few days the Civil Air Line, Rome to Berlin, has been inaugurated.

The mail service from England to India will shortly recommence passing over Italy, using the route Genoa–Corfu until such time as the route Milan–Rimini–Brindisi is fully organized.

No new Italian subsidized air services are to be created for the moment. Civil air lines are costly and their existence must be justified by actual traffic. We can not connect up with the British Imperial air services for the simple reason that we have very little Italian postal matter, passengers, or merchandise directed toward Africa and Asia. I do not know whether the development that has taken place in Eritrea and Somalia would justify to-day an expense

of approximately 20,000,000 lire ($1,050,000) per annum, which would be required to subsidize a civil air line from Massaua connecting up Rome and Mogadiscio. Neither can we compare Italy with Germany, for that country, not possessing military aviation, finds in civil aviation a means of keeping her aeronautical industry alive.

All the civil air lines have been created within the last five years. These lines must be brought up to efficiency similar to any other public service. Probably one or two routes will be changed; probably one or two lines will be changed. All this depends upon the Ministry of Communications, for if that ministry assists me our lines should develop with alacrity and perfection as to be the envy of all the great civil countries. There is only one line, that of Genoa to Gibraltar, which allows the postal service from North and South America to Italy to be speeded up. But, as has already been said, these civil lines must be classed as in the experimental stage.

Italian civil aviation must be present in the field of European civil aviation, but progress must be made with prudence. As civil aircraft are hardly utilizable in time of war, Italy must first of all converge all her financial strength to the development of her military aviation.

THE AERONAUTICAL INDUSTRY

Particular attention has been given to the aeronautical industry, whose prosperity is linked up with the efficiency of the air army, both in peace and war.

The old administration system which caused delay in regard to payments to the manufacturers has been abolished and if payment is not made within 40 days after the aircraft have passed all flying tests and been accepted by the Regia Aeronautica (Royal Air Force), the Secretary of State for Air is to be informed personally and immediately. The certainty of immediate payment is of great comfort to the aircraft industry.

The year under review has been a favorable one for the aircraft industry with regard to exportation, which reached approximately 60,000,000 lire in the past year.

PRESENT POSITION WITH REGARD TO MATERIAL

The pursuit airplane of the "Cr. 20" type will remain in service, but it will be improved by the installation of the Isotta Fraschini "Asso Caccia" air-cooled motor, or the Fiat "A. 20, AQ" type of water-cooled motor, instead of the present Fiat "A. 20" motor.

The aircraft for observation squadrons assigned to the army and to the navy will be replaced, but no definite type has been selected at the present, although it is hoped that a type will be selected during the coming year.

The squadrons assigned to the army are at present equipped with the "R. O. 1." and the "A. 120" type aircraft. The future type designed by the Romeo Company of Naples will be a three-seater aircraft, which is considered indispensable for aerial observation. The observation aircraft must carry cameras, radio sets, and sufficient armament to enable it to defend itself with its own armament against enemy aircraft. All this equipment was excessive for one observer only and this is why a three-seater machine has been developed.

Seaplane bombardment squadrons are at present equipped with the "Savoia S. 55" type of machine. At the present date this machine can be considered as one of the best bombardment seaplanes in the world.

The Italian day bombardment machines are the "B. R. 2" and "B. R. 3," equipped with the Fiat "A. 25" 950-horsepower motor, which can be considered as equivalent to a corresponding type of any other nation.

With regard to night bombardment aircraft, the present standard type is the Caproni "Ca. 74." The "B. R. 20," Fiat "B. R. G." and Caproni "Ca. 95" have been completed and can be considered as very successful and satisfactory types. Available funds, however, do not permit quantity production of these types which would enable us to re-arm complete squadrons.

RESERVE OF PILOTS—SQUADRONS OF TURISMO AIRCRAFT

The Regia Aeronautica reserve of officer pilots includes complementary officers and those officers of the permanent establishment who have either temporarily or permanently left active service. Their number is at present considered satisfactory.

Motorists, riggers, and other specialists who have served with the Air Force both during the late war and after, have also been included in the Regia Aeronautica reserve. It has thus been possible to obtain approximately 1,000 officer specialists, but the number of N. C. O. specialists is still considered inadequate for requirements in case of mobilization.

All the personnel of the reserve, both flying and nonflying, are trained at the squadrons of Turismo in light aircraft and at the Aero-Centri.

The Aero-Centri at present in existence are located at Milan, Rome, and Vercelli. Three more will be organized at Genoa, Turin, and Vicenza in the near future.

AIR MANEUVERS

I am fully convinced that in a future war the conclusive phase will be intrusted to the aerial army. I am also convinced that the task of protecting the country will be intrusted to its offensive capacity

rather than to any other kind of active or passive defense, but a doctrine in this respect is lacking and must be set forth. This is why next August very important aerial maneuvers will take place which will represent the most important test organized up to the present in maneuvering large aerial masses.

Seven hundred aircraft of the Italian aerial army, including pursuit and bombardment (land and seaplane) will be organized into two aerial divisions (one attacking and one defending). The maneuvers will take place over the Apennine Mountains between the Cisa Pass and Ancona, but the territory actually involved will include a large part of northern and central Italy with approximately 80 aerodromes, seaplane bases, and forced-landing grounds.

A great deal of experience will be gained from these maneuvers which will take place over mountainous and difficult country, etc.

Different flying formations will be tried out as well as masses for combat, attacks against industrial centers and large cities, by successive waves of attack. Offensive operations will be carried out against vital points of an army maneuvering on the ground, aerial bases will be destroyed, bombardment will be carried out from extremely high and low altitudes. Radio communication will be tested out extensively as well as means for disrupting radio communications.

The Regia Aeronautica reserve will participate in these maneuvers with a small number of light aircraft for liaison service.

ANTI-AIRCRAFT DEFENSE WILL DEMONSTRATE ITS POSSIBILITIES

Aircraft and armament will evidence their defects, which will be corrected later on. A first positive result can already be anticipated, i. e., the demonstration that all Italian cities are open to attack from the air, in spite of natural barriers. Against aerial offensive in large masses, as will be employed during the maneuvers, both natural obstacles and defensive equipment are of little value. The sky must be defended in the sky; this is my firm opinion. Perhaps somebody thinks that, from a defensive point of view, the Alps are much more effective than the Apennines. I think this opinion is erroneous and I consider the Apennines as effective as the Alps against an aerial offensive, but they are of little or no value against modern flying technique which can overcome practically any obstacle. Only a strong aerial army will guarantee freedom of Italy's skies, as well as protection of her territory. The maneuvers will practically justify this statement. Experience gained during the last war will be insufficient for establishing the tasks of the aerial forces in case of a future conflict. Maneuvers will complete this experience and to this end will also aim all enterprises organized

by the Regia Aeronautica year after year. I stick to the principle of employing aviation in masses.

Both the maneuvers and all the enterprises must teach us how to lead a large mass of aircraft revealing the most suitable flying and combat formations, and indicating the means to be employed so that the pilot readily understands the new technique and discipline of flight. The pilot who represented an individual independent force up to the present must be transformed and must be accustomed to consider his own action as a unit of a more complex and more important action until he reaches the point where he will fly and maneuver only a few centimeters from the wing tip of another machine, concentrating his attention on the tactical action and not only on the flying action, which is instinctive. Short distances mean in the case of pursuit machines the best training for combat; in case of bombardment, they create the possibility of covering long distances in the enemy sky with the certainty of a greater offensive capacity.

COLONIAL AVIATION

An application of the new science of aviation, suitable to actual warfare, has occurred in Libia, where in the unanimous opinion of the military authorities the operations of our flying columns have been decisive. Until to-day the assistance of aviation in important colonial campaigns does not seem to have been sufficiently appreciated and the heroic exploits of the aviators applied to the science of exploration and bombardment not sufficiently valued.

Anyone who has assisted in one of the solemn ceremonies of the annual distribution of medals for valor, on the anniversary of the foundation of the Regia Aeronautica, will have perhaps noticed the very great number of heroes of the air who have participated in episodes of sublime self-sacrifice, in cooperating with the army formations in the Italian penetration of the wildest zones of Africa, where visible signs of our dominion have not yet been felt.

There is no doubt that the air experience accomplished in the last few months in this large colony will serve to determine new concessions and new routes for the control of the colonial zone, most difficult and remote. The French have succeeded in controlling certain regions of Africa, the outposts of their dominions, with a network of aviation camps, placed every 30 kilometers on the military routes which spread out from the sea into the desert. The British forces in Iraq are principally air units. A more rapid and efficient control can be maintained in a colony by means of air supervision.

If this conception results, as I hope, in the adoption of the airplane on a large scale, it will economize in many white and coloured troops.

Amongst the criterions in serious war, aviation has revolutionized in the colonies the conception of transport over long distances. The military authorities have learnt that the most rapid way for them to carry out troop inspections is by airplane, and also the easiest means of communication is by airplane as it eliminates great loss of time. I hope that the air conception will mean that it will prevail, not only during hostile operations, but also during normal peace time expansion.

In the undertakings which have been accomplished during the last year, I must limit myself through lack of time to record only the principal events which have produced echoes of admiration from the entire world: the flights of a squadron from Rome to Mogadiscio, the Rome-Tokio flight, the recent flight around Africa by three Italian pilots in light turismo aircraft and the Air Circuit of Italy.

SCHNEIDER TROPHY RACE

In the present state of things, I can not say for certain whether we shall take part this year in the great international test. We must first estimate the extent of our preparations. Not as regards the men, because we can count on a group of more than 12 perfectly trained pilots in high speed flying over the special Schneider circuit, but as regards the machines which this year would have to make a satisfactory test in Italy over a similar course before going to England. I am well aware of the discouraging difficulties that the manufacturers must overcome to solve the problem of the Schneider, that is to say, to produce a machine, and above all a motor, which have the requisite capabilities to insure us the victory, which becomes more difficult every year. On the other hand, this race demands a sporting education such as to enable one to accept defeat with a good grace and without dramatizing the consequences. That is why, knowing that the trophy will not go undefended this year as France will compete, we will only take part in it if we have at least a guarantee beforehand of making a good showing. Should this be the case, as I hope it will, then Italy will not fail to be present.

But I repeat, I will not be subject to the inconveniences of the past years which were very prejudicial to us, i. e., that the Italian manufacturers should persist in the bad habit of delaying matters until the eve of the race when it is impossible to regulate properly the machines and motors. Once our preparations are made seriously.

whatever happens can happen. In the outcome of the race many weighty factors come into play, which are usually summed up as "good luck," and this, very often, is greater than the will of the men.

But should Italy be unable to take part in the race, we would not for this reason give up the special training which is being carried out in the high speed school, nor the very careful preparation of the men and machines, and the perfecting which the technique of the Schneider calls for. We would not renounce these things for the good reason that what seems impossible to-day can be achieved to-morrow, but above all because the advantages derived from the technical perfecting of high speed flying are of incalculable value. A few considerations will suffice. Training for the Schneider has made it normal to take-off the water up to 150–160 kilometers per hour for a duration of 80–100 seconds with a run of from 4 to 5 kilometers; it has made possible a normal take-off with loads up to 150 kilograms and even 180 kilograms per square meter; it has made possible the normal pilotage of machines at 530 and even 550 kilometers per hour; it has created a school and a system for carrying out regular evolutions at high speed; it has made it possible for machines to land at a speed of 160–180 kilometers per hour; it has trained in flying a series of pilots under conditions of almost negative visibility, with great difficulty in breathing caused by the exhaust gas, with centrifugal actions which reach six or seven times the gravity acceleration, under extremely difficult conditions of stability, either due to the intrinsic difficulties of the machine, to the heavy loads or to the high speed; the pilots fly in machines, the various parts of which are strained to the uttermost, thereby causing tremendous vibration.

If we carry on this experiment beyond the race to daily flying practice, we can endow aviation definitely with wonderful results: Fighting machines with a speed of from 350–400 kilometers per hour, which is the extreme limit for a fighting plane; the possibility of flying at high speed at very high altitudes; taking off with heavy loads per square meter; safety in flying over enemy country, due to the inability of the latter to strike the plane with his direct or indirect means of defense, either when flying low or at high altitude; the uselessness of listeners-in for the search of aircraft used by anti-aircraft batteries in view of the high speed of 110 meters per second of the fast plane with respect to the velocity of sound.

It is necessary to add that the preparation of the motors for the Schneider trophy race has brought their weight down from 1,000 grams per horsepower to 300 per horsepower. Allowing that the weight of squadron motors can not be limited beyond 630 grams,

one may consider a third of the weight as already gained, which induces us to make every effort to reduce by one third also the cost itself of the motors, which is counted in kilograms.

We bring these positive facts to the attention of those who are still sceptical on the usefulness of aeronautical races, to which might be added the results obtained from endurance records, which have brought down the consumption of lubricants from 15 to 3 grams per horsepower hour. Allowing for the fact that said minimum limits can not be reached in daily practice, and contenting ourselves with a reduction of 15 to 7 grams, we must however calculate that, when experience will be consolidated, the expense for lubricants in the new motors will be very much diminished, and these new motors will also have the advantage of greater efficiency.

THE USEFULNESS OF AERONAUTICAL ENTERPRISES, RACES, ETC.

This aeronautical year will rest in our memory on account of one of the greatest and most audacious accomplishments which the skies of the world have ever seen—the crossing of the ocean. This was carried out by a squadron of 12 seaplanes escorted magnificently on the sea by a superb division of the navy from the commencement of the itinerary from Italy to Brazil over a route 10,400 kilometers in length.

I will not dwell upon the scope or result of this aerial cruise because both in Italy and outside Italy these are still remembered, and the event has been classed from a technical and moral point of view as the greatest event registered in the history of aviation. The Italian flag, carried from Rome to Rio Janeiro by soldiers of the air in a close and compact formation, has revealed to the world what is possible to the Fascist spirit of the country, and more so as regards the strength of internal discipline which surrounds the Duce, who is in command, as a great civil militia ever growing greater and more audacious.

The adversaries of Fascist Italy have been confused and disorganized by the roar of these machines, which have linked up the skies of three continents and violated the silence of the oceans, carrying on their bows the Littoria Fascia.

THE FLEET AND THE AIR

Gilbertian Organization of a Branch of the Navy

By Capt. Bernard Acworth, R. N. (ret.)

[From London Morning Post of May 1, 1931]

During the past few years much ink has been spilt, and not a little temper excited, over the fleet air arm. In my recent book I have devoted considerable space to this aspect of naval warfare, and I have suggested that the navy, by overemphasizing the importance of aircraft at sea, has led the country to regard the navy's plea for its own individual control of its own air arm as an outburst of professional jealousy as well as an admission that the air is going to become a substitute for the sea, whether in defense or transport.

I have criticized, rightly or wrongly, the use of land machines over water; I have questioned whether aircraft carriers are, under all the circumstances, the ideal means of operating aircraft at sea. I show that reliance upon aircraft spotting has led to a form of ship construction, a design of gun mountings, and a form of very long-range tactics which, without such reliance, would never have come into existence.

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Sir Richard Webb, in his lecture at University College, laid great stress on the value of flying boats and seaplanes catapulted from fighting ships. He expressed the growing view that huge, vulnerable, and costly carriers are well-nigh obsolete. But flying boats are not capable of keeping the sea with surface craft, and seaplanes, if catapulted into the air, can not be hoisted back into their ships quickly. Into all these factors, which together constitute a dilemma of some magnitude, I have entered in my book, and I have offered the solution that, in my judgment, is the most satisfactory.

Whether my contentions are right, in all main essentials, or for the most part wrong, the navy, and the navy alone, can decide. All these matters are receiving the most careful and conscientious consideration by responsible officers, and the controversy surrounding the points at issue is as healthy as it is loyal and friendly. There is, however, an aspect of the fleet air arm which is entirely uncontroversial. No naval officer, no army officer, and no disinterested civilian with whom I have discussed the matter disputes for a moment

that the navy should be the master in its own house and should share its responsibilities with no other profession.

The extent of the intrusion of Air Ministry fingers into the naval pie is not, I think, understood by the public, and it may be of interest and value to indicate accurately the form which this divided responsibility takes.

Piloting an airplane is an activity which, as we know, can be performed satisfactorily by soldiers, sailors, and civilians, male or female. Why, therefore, is it necessary to insist that 30 per cent of the flying personnel of the fleet air arm must be R. A. F. officers, half of whom are short-service men engaged in a blind alley occupation with no professional future before them in the navy or air force? Surely here we have an example of unnecessary fingers in a necessary pie. To whom, furthermore, do R. A. F. officers serving at sea owe their primary allegiance? To which set of masters are they to look for promotion?

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Turning to the training of pilots, we find that naval officers have to be trained by R. A. F. instructors right up to the point at which they commence deck landing on carriers. In the carriers young R. N. and R. A. F. officers serve under a wing commander (R. A. F.) who, in his turn, serves under a captain, R. N.

All observers are naval officers, and these are trained in the essentially naval art of warfare at sea at Lee-on-Solent, commanded, *mirabile dictu*, by an R. A. F. officer, under whose supervision they study navigation, though their gunnery and signal training is carried out at naval establishments. It can hardly be maintained that naval officers are incapable of managing their own flying operations, for their record in the air compares most favorably with the record of any other body of men in the world. Their immunity from accident is startling by comparison. Were not naval officers the pioneers of flight 25 years ago?

But perhaps we reach the zenith of unreason in the division of flying duties. We hear a lot about the great future of seaplanes and flying boats and at the present time there are seven flying-boat squadrons and one seaplane squadron in existence, all designated as "for naval cooperation and training." Here, then, are eight squadrons of sea-borne aircraft, ostensibly for work at sea, manned and commanded by the R. A. F., and based ashore. The land machines, on the other hand, are laboriously and at enormous cost conveyed to sea and flown over the open sea by sailors—surely a situation that would have tickled into active expression the satire of Gilbert.

Turning to the supply of material, the muddled procedure is as follows: The admiralty states requirements to the Air Ministry,

which issues tenders to the trade. The Air Ministry examines tenders and selects the best. The Air Ministry and admiralty then discuss the tenders already accepted by the Air Ministry. If agreement is reached the Air Ministry places orders and carries out first trials. If considered satisfactory by the Air Ministry the airplanes are next sent to ships for sea-going trials. As a result of these two sets of trials the Air Ministry selects the types to be produced in bulk and the admiralty are finally asked if they agree. Orders are then placed by the Air Ministry, and the admiralty is required to approach the Air Ministry for supplies to make good losses.

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The cost of the whole service, administered and controlled for the most part by the Air Ministry, is borne by the naval estimates. Here, surely, is a division of responsibility that is as conducive to extravagance and cross-purposes as it must be exasperative.

It is now generally assumed that the separate Air Ministry was called into existence by overwhelming strategical necessity, but the facts are quite otherwise. It was created at the end of the war to deal with the fantastic output of airplanes (90 per diem), only a fraction of which were, or ever could have been manned. Even so, a separate ministry was, as has been shown in The Great Delusion, not unlike using a steam hammer to crack a nut, if a large one. The nut has now shriveled to the size of a diminutive peanut, a fact which undoubtedly causes the Air Ministry to cling tenaciously to purely naval concerns without responsibility for which its *raison d'être* might well be called into question.

Surely the navy can be trusted to train and administer its own personnel and to contract for its limited needs in material. Flying is not in itself a profession, and naval officers can take it easily and inexpensively, in their stride, reverting to ship duties at any time.

THEORIES OF STRATEGY

PART II

By Captain Groos, German Navy

EDITOR'S NOTE.—*A German naval officer reviews a recent volume, Theories of Strategy, by the well-known French naval writer, Admiral Castex.*

Part I of this review appeared in the July, 1930, issue of the O. N. I. Bulletin, and a portion of Part II, The Submarine Weapon, appeared in the February-March, 1931, issue of the O. N. I. Bulletin.

THE AIR FACTOR

The author, Admiral Castex, then proceeds to the consideration of the aerial weapon. In his opinion it is impossible to formulate any rational doctrine to-day without taking the air factor into account. This presents extraordinary difficulties, however, since, contrary to the case of the submarine, we have no war experience on which to base our estimates of this factor. In the course of the last war the airplane was used at sea almost exclusively to combat the submarine and (aside from the coast defense warfare) it encountered practically no opposition from its own kind. In this respect the naval air force differed greatly from its sister weapon on land, since the latter was employed in the World War under conditions which will hold for the future. Therefore, in so far as pertains to the probable methods of employment and in strategic evaluations for the next war, we are compelled to fall back on assumptions and predictions which are primarily matters of individual opinion. Consequently, the author wishes his treatment of the question to be considered simply as his personal concept, expressed solely for the purpose of bringing certain matters to the attention of the reader and stimulating further thought along these lines.

The airplane, as a weapon in aerial warfare, shares with the ship in naval warfare the peculiarity that neither can maintain its position indefinitely in a fixed locality. Even less is it possible for the airplane to conquer territory and hold it by occupation. The action of the airplane is essentially of a temporary and often of a critical nature. As an instrument of war it is not adapted to an operation which requires persistence in space and duration in time. Every effort made to overcome these peculiar properties of the weapon must inevitably result in the speedy exhaustion of the personnel and matériel. Further, the radius of action is relatively limited for the attainment of the war objectives and in the scouting plane this radius

can only be increased at the expense of its fighting qualities. Consequently, in every theatre of war a distinction must be drawn between those areas which are exposed to the attack of enemy planes in large number and those which are relatively inaccessible (or which cannot be reached by an enemy aerial striking force). Efforts will therefore be made to maneuver with the surface forces in such a manner that strong counter-measures on the part of the enemy airforce can be avoided, while at the same time our own air force is capable of rendering the maximum support. For the same reason a naval war conducted in confined sea areas, such as the North Sea or the Mediterranean, will partake of quite a different character from one in which the wide expanse of the ocean is available and where the aerial weapon can only be brought into action aboard specially designed aircraft carriers in relatively small numbers. If two belligerents are separated by a wide ocean, then, from this point of view, each will strive to draw the other toward his own coast within effective striking range of his own air force while at the same time keeping clear of the enemy air force. With increasing space therefore the aerial weapon loses in importance, but on the other hand, its numbers increase with time, in the sense that during the course of the war the airplanes and personnel may be more quickly replaced and augmented than the ships.

A further advantage of the airplane lies in its incomparable freedom of motion, since it may make use of the third dimension to a much greater extent than the submarine. In addition its speed is four or five times greater than that of the fastest ship. On the other hand even to-day the airplane is greatly dependent on weather conditions and storms, heavy rains or snow, and above all, fog, greatly impede its employment or may indeed make it impossible. At night also, the flier can see no more than the rest of mankind. These disadvantages of the airplane will be taken into account in the naval warfare of the future in the sense that every effort will be made to restrict the effectiveness of the enemy aircraft while at the same time increasing our own. Owing to the great dependency of the aerial weapon on weather conditions it follows that one can not count definitely upon its cooperation and support at all times. If, therefore, one is dependent on the air force the freedom of action of the naval force will frequently suffer under these disadvantages. On the other hand, the aerial weapon, to an even greater extent than the submarine, offers the possibility of extending the reconnaissance and the battle far beyond the effective range of the surface forces or the forces on shore. " The sea is no longer an obstacle which can only be overcome with the aid of maritime forces. Insularity, combined with superiority on the seas, no longer assures complete pro-

tection." The field of battle is extended to include everything which can be reached by the airplane. It is expanded in a unique manner and the existence of "fronts" is no longer a fetter binding one to partial attacks on definite objectives. Operations may be conducted against the rear of the organized forces in a manner which was never before possible either with the cavalry on land or with cruisers on or below the surface of the sea. The assumption, however, that the "front" no longer has any meaning is an exaggeration, since the conquest of enemy territory remains as always the final and inevitable goal of all military operations. But the districts in rear will be drawn into the field of hostilities to a far greater extent than formerly; which means a further step in the direction of "absolute war." However, even this concept is open to exaggeration, since the radius of action of bombing planes is limited to such an extent that some areas in a large country must lie outside its effective range and consequently its activities will be directed against railway and industrial centers as well as large cities. While the inhabitants of such areas and cities will be constantly exposed to the danger of such air attacks and must therefore be regarded as combatants, the farmers and inhabitants of small towns will suffer only accidentally from such attacks.

Little as it is possible to characterize the command of the seas as a permanent and unassailable control of the surface, still less can we speak of command of the air in the sense of a continuous control of this element. It lies in the peculiar nature of the weapon that the side having the strongest aerial forces can not permanently assert this command in its own element. Owing to the great speed and freedom of movement of the airplane, even the weakest enemy can not be denied the use of the air for reconnaissance and bombing flights. The question of attacking him during the flight will always be more or less a matter of pure chance. If our own planes must first take off on sighting the enemy, the latter can always turn about and cover several hundred kilometers before our own force is in the air. On the other hand, the superior air force can always appear at a chosen instant over a desired area in such strength that command of the air is assured, although this command must necessarily be restricted to a very brief interval of time and confined to small areas. Under the circumstances, however, this will suffice for the accomplishment of the purposes of the attack.

Castex is of the opinion that for these reasons the superiority in the air will be felt much more by the weaker side than inferiority on land or at sea, for instance. It is relatively easy to contend with superiority in numbers on land, more difficult at sea, but almost impossible in the air. The course of action will always be definitely

prescribed by the stronger to such an extent that the weaker can hardly hope to obtain success from his own operations. The possibility of being able to take off simultaneously from several airports and of effecting a tremendous concentration for an overwhelming surprise attack against fixed objectives on land or sea, reveals the possibilities for success in a most favorable light. Until the last moment the defense remains in complete ignorance of the time and place of the attack so that the counterattack will frequently be made too late, particularly since continuous measures to hinder or prevent attacks from the air are scarcely possible. True, such operations as we have considered here are largely in the nature of bombing attacks against objectives on land or at sea which rarely, if ever, move from a fixed position. In such cases the most rational countermeasures by the defense will consist in attacks against similar objectives of the enemy in order to anticipate his attacks and thus bind a part of his combatant forces to the defense of these positions. An even better course is to seek battle with the enemy air force in an effort to destroy the enemy power in the air, but here the greatest difficulty of the aerial offensive begins; viz, that of gaining contact with an enemy which is capable of covering immense distances in a very short space of time. This may be facilitated as in naval warfare, when certain objectives are at hand to attract the enemy aerial striking force, such as surface vessels, convoys, bases, etc., against which the enemy attacks will probably be directed. In special cases it might even be necessary to create such definite objectives for the purpose of deliberately attracting the enemy air force. The means to be employed will be those which Castex has already designated in naval strategy as "offensive, based on geographical position." It is always in order when it is a question of an enemy who is hard to reach, be it a submarine on account of its invisibility or an airplane on account of its speed.

If the enemy air force fails to succumb to this temptation, fearing a trap, and if the enemy air force remains on the water or in their hangars, there is always the possibility of attacking them in their bases and destroying both together. For the same reason the destruction of enemy aircraft carriers is of the greatest importance. The aerial combat will, however, always remain the principal aim, even though its effect may not be so decisive, and is consequently of quite a different order from a victory on land or at sea, for the reason that aircraft are much easier to replace than the instruments of war on land or at sea. On the other hand, the replacement of the personnel may offer some difficulties and the moral effect on the survivors will be such that quiet will prevail for a time after the battle.

With regard to the objectives of the aerial weapon, these are in general the same as in the war on land or at sea, but a dis-

tinction must be made between purely military objectives and others, since the latter will always offer a certain attraction since an attack can be made on them with slight risk to the striking force and such attacks will always create considerable sensation. But this line of thought leads to the old illusion. It is analogous to the effort to force a decision by the neglect of the enemy fleet in naval warfare in favor of commerce and industrial warfare, whether conducted with submarines or with cruisers. It therefore becomes the problem of the commander in chief to assure the employment of the air forces primarily in support of the forces on land or at sea to achieve the victory in battle against military objectives. In doing so the high command will undoubtedly be exposed to strong pressure from irresponsible advisers and the temptation to employ the air forces in independent operations against nonmilitary objectives. Naturally, such attacks, as in cruiser warfare, may at times serve a rational strategic purpose, either as a diversion to equalize the strength ratios in the main theater of war or to achieve some political, industrial, or moral success of a nonmilitary nature which still has some influence on the war as a whole. According to Castex the organization of a special air force for such purposes, entirely independent of the naval and military forces, is not justified either by the importance or by the number of such undertakings. In his opinion, it will suffice to draw on the naval and military air forces for such aircraft as are best suited to the purpose when the emergency arises, depending on whether the problem concerns objectives on land or at sea. Castex considers this solution more logical than the reverse; i. e., the organization of an independent air force for special service which may, as necessity arises, be assigned to service with either the army or the navy, because "air attacks on nonmilitary objectives will be the exception rather than the rule while aerial attacks on the military fronts are continuous and enduring and involve the employment of means which in practice will always be found to be inadequate." Castex also opposes placing the aircraft of the army or the navy under a unified command, since the organization should emanate from the primary service to be rendered in connection with the operations. In the interest of unity, the combined operations on land or at sea should be conducted with all of the weapons which come in question for such operations under one command; i. e., the corresponding commander on land or at sea, as the case might be. Further, though it appears advisable in war on land to subdivide the air force and to place detachments of the air force under the command of the individual division commanders up to the commander in chief, depending on the nature of the war, Castex believes that in naval warfare it is

better that the greater part of the entire naval air force be under the orders of the force commander in a definite theater of war rather than distributed amongst the individual subordinate commanders and the naval districts. This, for the reason that the concentration of a powerful air reserve under a unified command favors the rapid concentration and surprise employment of masses of aircraft—a decisive factor in the success of the operations.

With regard to the assignment of naval aircraft to the army and vice versa, the importance of the problem should be the determining factor. Having in view in particular the great freedom of the aircraft and the possibility of making rapid shifts with a force which is capable of maneuvering almost equally well over land or sea, there are possibilities for cooperation between naval and military aircraft of the greatest strategic importance. Such joint operations must serve to promote the much desired unification in the conduct of the war as a whole. Castex is of the opinion that, contrary to the case of the naval and military forces, this possibility of double employment of the air forces will redound to the advantage of both services in warfare. In the case of France engaged in a war with a superior sea power, the corresponding development of the air forces might even bring about a certain equalization of the strength ratios.

After these general considerations Castex turns to the problem of the probable employment in the future of bombing squadrons against a group of battleships. Even though we assume that the fire from the small-caliber antiaircraft guns of 3.7 and 4 centimeters will force the bombing planes to maintain an altitude of over 3,000 meters, it must be granted that present-day sighting devices are sufficiently developed to assure an adequate number of hits even from this great altitude. On the silhouette of a battleship towed at high speed on zigzag courses, over 20 per cent of hits have been obtained from an altitude of 2,000 meters. In addition to this we must take into consideration the great effect to be expected from bombs which drop short or over and explode in the immediate vicinity of the vessel. With the greatly improved modern bomb-sighting devices the airplane needs to fly on a straight course for about 20 seconds only in order to obtain the necessary ballistic data. This circumstance, together with the great altitude of the aircraft and the large number of attacking planes, will considerably reduce the probability of their being hit even by a shell from the 7.5 and 12.7 centimeter guns. Further, Castex considers it no exaggeration to state that of our, say 40 planes in the striking force, the greater part will reach positions favorable for bombing even though a few be shot down. Though it may be possible by means of barrage fire to prevent the enemy bombers from reaching the limited position necessary for bombing, the

problem becomes much more difficult where the ships have to combat planes which are armed not with bombs but with nonrecoil rapid-fire guns of small and large caliber. These planes are capable of attacking from positions which are not restricted in area, as is the case with the bombers. The same holds true of the torpedo planes, in which the probability of hitting increases with the altitude from which the torpedo can be launched—a problem for which all navies are seeking a solution along the same lines.

With regard to the effectiveness of aerial bombs on the target, the Americans have already developed bombs of over 970 kilograms with explosive charges weighing over 435 kilograms and have used bombs weighing as much as 1,815 kilograms. Efforts are now being made to develop new bombs which, in addition to a heavy bursting charge, will have greater penetration in order that the bomb might pierce the armored deck and the burst take place within the vital parts of the ship. However, the battleship is not without protection against this terrible weapon. It is possible to construct several protective decks having a total thickness of armor up to 200 millimeters to prevent the penetration of the bomb, while the hull may be protected against damage from underwater explosions of bombs or torpedoes by a further development of the water-tight integrity of the ship. This was proven by tests on the *Washington* in 1924. But even though the effectiveness of the above-mentioned weapons may not be sufficient to bring the ship to the point of sinking, the vessel will be badly damaged at least and in any case its fighting efficiency will be greatly reduced by the damage inflicted on the superstructure and upper works. In the most favorable case the vessel will have to be laid up for repairs for a considerable length of time and this loss must become proportionately greater the greater the value of the damaged ship as a fighting unit and the greater the need for its participation in the war as an integral part of the fleet.

From this point of view the airplane will operate in a manner similar to the submarine in forcing a reduction in the displacement of the individual battleship. We should add to this conclusion of the author the fact that the lower limit will be set by the necessity for providing the ship with sufficient resistance to oppose this new weapon.

Many readers will be inclined to regard the above-mentioned effectiveness of this new weapon as something unavoidable to be classed with the other hazards of war to which all are exposed, but which can be accepted because the possibilities of mass attacks by airplanes will be rare (owing to the tactical difficulties in their execution), and further, such attacks can be avoided to some extent by proper measures, as a result of the great mobility of surface craft.

But granting this, the fact remains that the defense of the ship at anchor becomes far more difficult, and therefore, as a result of the great development of the aerial weapon we are confronted by the fact that although formerly the ships felt themselves reasonably safe in their bases, they may now be attacked at any time by enemy aircraft and severely damaged. Owing to this menace many of the fleet bases which were formerly considered secure can not be accorded the same importance as in times past, while others more favorably located geographically must be preferred for this reason. From this standpoint Castex can not understand why the naval arsenals at Lorient and Rochefort were abandoned since they were much less exposed to the danger from air attacks than the other bases.

In the open sea ships will be able to make use of their maneuvering power in addition to their armament and speed to defend themselves against attacks from the air. But the modern battleship with speeds of about 20 knots and large turning circles are limited in this respect, the more so since they are generally hindered from taking full advantage of these possibilities by the fleet formation. A loosening of the formation, an increase in the distance between ships, will be the probable result, and, in the opinion of the author, this will ultimately lead to a change in the distribution of the total battleship tonnage—not in a few ships of great displacement, but in a larger number of ships of smaller displacement with greater powers of maneuvering. "Let us assume that a single battleship of 30,000 tons and 20 knots speed is replaced by three *Duquesnes* of 25 knots speed and we shall find as a result that the aircraft will be faced by a more difficult problem in the attack." The same total tonnage distributed amongst 12 *Panthers* of 2,500 tons each and 30 knots speed will still further reduce the possibilities of a successful air attack. The attack will be even more difficult against smaller and faster ships with the formation dissolved. In order to obtain hits on these vessels the airplanes must descend from the safe altitudes into the danger zone of the small-caliber antiaircraft guns. The individual ship on the surface will always be superior to the individual airplane in the air, and from this fact we may draw our conclusions with regard to the corresponding changes in the tactics of the naval forces afloat with respect to numbers, speeds, displacements and maneuvering ability. "In opposing the aerial weapon, excessive concentrations must be avoided either in fighting strength or in space. The requirements of the future will lead to a certain open order in the formation the degree of which will depend upon many circumstances." At the present time this is strikingly manifested in the material difference between the conduct of war on land

and on the sea. On land the combatant groups, widely dispersed, are much less vulnerable than the communications in rear—the roads, railways, and buildings. At sea the situation is exactly reversed. Here the ship of large displacement, representing the greatest possible concentration of fighting strength, offers the best target while the communications in rear, such as they appear on land, do not exist at all in naval warfare and are consequently not subject to attack. The conclusion which Castex draws from this line of reasoning is that in the future the tonnage of the present-day battleships should be distributed amongst several smaller ships. Therefore when he speaks of the "organized forces" he does not refer to the fleet as composed of units in the old sense but rather of groups which approach in theory the ideas of the "jeune ecole." Such groups of small vessels should theoretically be able to retain their freedom of action in the face of the aerial weapon.

In reality, conditions in naval warfare are not so simple that it becomes solely a question of engagements between one weapon and the other or between ship and airplane. It is evident that the possibilities for the success of the airplane will be enhanced when the aerial striking force is accompanied by surface craft of their own which attract the attention and fighting strength of the enemy. If the surface forces are mutually engaged in an artillery duel the airplanes will have less to fear from the antiaircraft batteries and may safely descend to lower altitudes to launch their attack under more favorable conditions. On the other hand, ships will not rely solely upon their antiaircraft batteries for defense but will oppose such aerial striking forces with fighting planes of their own operating against the attacking force. "Just as the torpedo boat was opposed by the destroyer, the bombing plane will be opposed by fighting and pursuit planes." When a condition of equilibrium has thus been reestablished in the air, the surface force will regain its freedom of action, which will only fail to reach the degree formerly enjoyed simply because the control of the air is subject to much greater restrictions in time than is the control of the seas. Therefore, the fact remains that the menace from the air must always be taken into consideration to a certain extent. The displacements of the battleships will not need to be reduced to that of the present-day destroyers, but a balance will be carefully worked out in which consideration is given to all factors including the location of the bases, the nature of the theater of war, and the possibilities which exist within these geographical limits for the use of the aerial weapon.

Another much discussed solution of the problem consists in converting the former warships into airplane carriers as well as gun carriers. In the opinion of the author, however, this is a step in the

wrong direction, since too much would then be attempted and neither requirement could be adequately fulfilled. Such a ship will of necessity be a poor aircraft carrier as well as a poor gun carrier. If therefore the theater of war is not sufficiently limited so that it may be controlled by airplanes operating from shore bases on the coast, it is better to build a certain number of specially designed aircraft carriers, as has already been done. But even for these vessels, which are exposed to the menace from the air as well as other surface craft, the same rule holds, and instead of concentrating the total displacement in a few gigantic aircraft carriers, it is advisable to build a number of smaller ships for the purpose. The necessary protection against torpedoes and aerial bombs, which are particularly dangerous to these ships, should be obtained by sacrificing displacement instead of speed. The protection of these vessels from attacks by enemy surface craft will fall to the lot of their own armed vessels. Therefore, little as the airplane will displace the battleship, the salvation does not lie in seeking to unite them too closely. It is practically the same thing which always occurs when a new weapon is introduced—instead of displacing its predecessors it finally results in supplementing them by contributing its own possibilities. The submarine affords a striking example of this. At first it was thought that the most dangerous foe of the submarine had been discovered in the airplane, but to-day the greatest possibilities in the future are seen in the cooperation of the two.

With this discussion we arrive at the question of the employment of aircraft in commerce warfare and for the protection of the ocean-borne commerce. If, in order to simplify the analysis we start on the assumption that one side possesses surface craft only while the other side has only airplanes, the conditions for the air power will be most favorable when attacking convoys escorted by warships. In accordance with the provisions of international law, convoys are liable to attacks of this nature, since a convoy is considered as a military formation. In such cases the airplanes would proceed to bomb the merchant ships from high altitudes, as these ships are not so fast and mobile as the warships, and since they are of great size and can offer no resistance, the convoy will be badly damaged if not totally destroyed.

The situation is quite different, however, and much more unfavorable in the case of an airplane operating against a single merchant ship than was formerly the case with the submarine. Before the airplane can commence hostilities it must first determine the nationality of the ship and consider what possibilities exist for saving the passengers and crew. "It is quite possible that the future might see some belligerents who will ruthlessly disregard such matters; * * *

this is possible, but highly improbable." It has been suggested that in such cases the airplane can compel the merchantship to lay a course for the nearest port for search and investigation, but this will depend entirely on whether such a harbor is close by, since if darkness intervenes the airplane will lose the ship and the latter will resume her old course. The question of blockade also brings up differences. If such a blockade is established, then, in accordance with all recognized rules for belligerents in naval warfare, the armed forces are justified in taking hostile action without warning against any blockade runner. But in this case also, darkness will necessarily interrupt the activities of the aircraft. "Summarizing, the great disadvantages of the airplane when opposed to a single merchant ship are very apparent and it is evident how little the cooperation of surface forces can be dispensed with in commerce warfare. Even less are they capable of affording protection to their own merchantmen. If we retain the assumption originally made that one power possesses only airplanes while the other has only a surface force, the former will pay for the conflict by the complete loss of all of her overseas trade and communications while the latter will be able to maintain her own communications even though sustaining some losses, provided only the geographical situation permits the airplanes to attack without the need of cooperation with surface craft. It is true, objection might be raised that it would be better not to form convoys at all under such circumstances, but this is not done for protection against aircraft, it is necessitated rather by the need to protect merchantmen from submarines and other surface craft and can not be dispensed with if the enemy possesses means for combat on the seas."

With these considerations we pass from theory to practice, which consists in the complementary employment of all of the instruments of warfare. It will then be argued that the convoys should not only be protected by warships but by airplanes as well, at least in those areas in which the vessels are exposed to the menace of the enemy aerial force. But even in this case it will soon develop that the entire force of pursuit planes will be inadequate to protect the various scattered groups of merchantmen in widely separated areas in addition to fulfilling their essential duties with the fleet. It will therefore become necessary to assemble the individual convoys into extremely large convoys, especially in those areas in which the commerce is threatened by the enemy from the air and on the seas. Consequently the air force and surface force must work together in joint operations to insure the safety of the overseas commerce. Therefore we see once more that success can only be expected through the complementary operations of the two weapons, since, on the other hand, it must be granted that the total lack of such a defensive air

force or even a marked inferiority in the air will be accompanied by the most serious consequences in so far as pertains to the protection of our own commerce.

With regard to the employment of aircraft in attack and in the defense of the coast, Castex gives us a particularly vivid presentation by making a comparison with the war at sea. Let us imagine that one side possesses all the means for coast defense while the other possesses a fleet capable of attacking. Let us assume that the maximum range of the coast-defense batteries is only 3,000 meters while that of the ships' batteries is from 7,000 to 8,000 meters. If, then, we turn this picture through an angle of 90° until it is vertical, we have an exact representation of what a modern aerial attack on coastal fortifications and shore defenses may mean. We may therefore turn back to the ideas of coast attack current in the preceding centuries with the exception that the aerial striking force is operating against a surface instead of against a line. The new factor introduced into this form of warfare is that the air force may operate not only against the front but equally well against the rear and against all of the military and nonmilitary objectives which are of importance in the prosecution of the war. If we assume that the radius of action of a heavy bomber is 300 kilometers, we can readily imagine the area of the zone menaced by such attacks. "The sea itself is no longer a barrier against them—on the contrary it offers the attacker certain advantages. An attack which comes from the sea is in actual fact much more difficult to discover ahead of time." A complete defense of all of the points which may become the objectives of such an attack is impossible in accordance with the classic law of the inferiority of the defense and particularly in view of the uncertainty of the aim of the striking force. The problem is made more difficult by the fact that in aerial attacks the strongest possible defense afforded by pursuit planes, artillery, searchlights, balloon barrages, and smoke screens can not insure absolute protection against such a striking force. For these reasons the series of enemy attacks from the air on the strongly fortified cities of London and Paris were not without success when executed at night. Since that time the weight of the gas and incendiary bombs has been greatly augmented and air navigation at night has been practically perfected. Further the great requirement for airplanes, that they should not be discoverable by the noises of their motors is soon to be realized, and in consequence night attacks promise to be even more successful and easier to conduct. It is unnecessary to go into further detail with regard to the feeling of helplessness and the moral effect engendered by such night bombing attacks.

But, because the reality is already sufficiently serious, Castex believes we should be on our guard against exaggerations. In the last war the attacks on London and Paris produced a certain moral effect, but since the bombs were released over widely scattered areas the material damage was relatively slight. The principle result was that a large number of antiaircraft batteries were bound at these points. Even the powerful attacks which were made on Zeebrugge and Ostende during the war were incapable of demolishing the German submarine bases owing to the defensive measures taken. In the bombardment of cities and other large areas by warships—and from this standpoint it is immaterial whether the explosive reaches the town from the air or from the sea—the material damage which resulted was surprisingly small in every case. "Why, then," writes Castex, "should the effectiveness of bombs dropped by aircraft be any greater, when, with the greatest perfection and the maximum effort possible for them to put forth, they can not have at their disposal a greater weight of explosives than that fired by a squadron of battleships?" With regard to the moral effect also, it can not be immaterial that the duration of the attack must necessarily be considerably shorter than a naval bombardment from the sea. At the same time due account must be taken of the requirements of warfare in the future and these, according to Castex, consist in avoiding excessive concentrations either on land or at sea.

The best means of defense against the aerial weapon is dispersion, deconcentration, and division, whether applied to ships, guns, industries, or oil tanks. In this connection we revert to the great law of general application—the perfection of the weapon must result in a dispersion—the dissolution of the formation—as a logical consequence. In the fighting on land in the last war we were finally compelled to accept this conclusion, although not without passing through disastrous experiences at the beginning. The organizations behind the line were then distributed over as large an area as possible. In the future this will hold with regard to the location of the industrial works in the various countries, regardless of the opposition to such an arrangement offered by the private interests concerned. Although all concentrations of production means are seriously menaced by the aerial warfare, the vulnerability of such plants is effectively reduced by greater dispersion over large areas.

While not overestimating the losses incurred amongst the civil population as a result of the air attacks, the large cities, industrial centers, and other bases necessary to the conduct of the war might well be evacuated by the superfluous civilian population. Further, the question of the transfer of important administrative officers from the capital might be given serious consideration. According to

Castex the French had a taste of this during the war when Paris was bombed from March to July, 1918. The attacks by the Germans with the Gothas and long-range guns gave many of the Parisians a suddenly renewed love for life in the rural districts. Only those who are required to remain to man the defenses, similar to the crews of merchant ships, may be considered in the light of combatants; but measures can be taken for the protection of the rest of the civil population who need not be regarded as combatants. Under such circumstances the aerial attacks, which are limited in space and duration, need not result in excessive disturbance to the functioning of the governmental and industrial organizations. The air attacks will thus lose much of their decisive character and the effectiveness ascribed to them by their proponents, particularly in cases where the civil population displays the necessary courage and careful provision is made to ameliorate their sufferings. The experiences of the last war as well as those gained in the later battles against the Riff tribesmen in the Mohammedan countries affords much evidence in favor of this plan. In every case, however, as in the past, the ultimate decision in the war will be brought about by the occupation of enemy territory and the military operations conducted against the organized forces on land and at sea, in which the support of the aerial weapon will be an important factor.

The attacks on the docks and fleet bases only comprise a part of the whole problem. Here also the decentralization and dispersion of the forces is advisable, in so far as it can be realized in practice. This plan is absolutely essential, however, in the case of munition depots and fuel oil supply bases if catastrophies are to be avoided. In this connection Castex can not suppress his astonishment over the mistakes which have been made in recent years in the establishment of many munitions depots. Subterranean storage must be provided for all easily detonated munitions and for all liquid fuel, while all important workshops and magazines must be protected by all means against aerial attacks—places of refuge (shelters) provided for the personnel, gas masks, fire extinguishing apparatus, and special provision for eliminating poison gases. "A dockyard which lies within striking distance of the enemy air force, which is not protected in accordance with these provisions, must count in practice as nonexistent." The employment of pursuit planes, searchlights, antiaircraft guns, balloon barrages, etc., which will render the aerial attack more difficult, should not be neglected, although the effectiveness of these defense means in themselves is limited. The militarization and the assignment of the dockyard personnel to defense stations will help to make these provisions easier to put into execution.

The possibility of aerial attacks on fleet bases will naturally exert an influence on the fleet which has to make use of these bases. As stated before it is quite possible that under favorable geographical circumstances the fleet might be attacked by bombers and torpedo planes while at anchor in the base or while lying alongside the docks. Under such conditions they may be severely damaged if not destroyed. "Battle can no longer be avoided even though one fleet should shut itself up in its harbors. Repeated attacks from the air will force the fleet to put to sea, and in such cases aerial attacks appear to offer the best means to force the battle." It will also be necessary to consider whether or not fleet bases are available which are not too far removed from the theater of operations of the surface forces and still sufficiently removed from the enemy air force to minimize some of the hazards mentioned above. Naturally, the large industrial workshops can not be suddenly removed to safe areas as if by magic immediately on the outbreak of war. Similarly, ships which need to undergo repairs must necessarily return to the fleet bases and dockyards and run the risk of the dangers to which such localities might be exposed; but for periods of relaxation and for refueling it will be necessary to establish outlying bases, as was done in the last war with the establishment of the auxiliary bases at Scapa Flow and Corfu. Thus the fleets will separate to an even greater extent than in the last war, in which the separation was brought about by the menace of the torpedo boat and submarine. "Aside from active operations, the moment the crisis develops efforts will be made by both sides to maintain a respectful distance between the hostile forces."

But the bases for the air forces are naturally exposed to the same danger which threatens the fleet bases—namely, the menace offered by the aerial striking force of the enemy. For them also the rule holds that dispersion over wide areas should be sought rather than concentration. Such air attacks can accomplish little against individual and widely separated seaplanes anchored on the water. Further, the air attacks on enemy communications may be extended to include attacks on commercial harbors of the enemy. Although in former times naval bombardments of such ports were considered in the light of bombardments of "open cities," the airplane "has since widened the concepts of international law and to-day the commercial ports can not be considered as open any more than the rear of the enemy front, which no one would hesitate to bomb in time of war." The sole difficulty lies in the fact that the commercial harbor might contain neutral shipping at the time. Such shipping, however, might be granted a certain time in which to leave port after the attack had been notified. Whether or not such procedure will be

successful in the future will depend upon the political situation in general. On the other hand consideration must be given the fact that in all probability the fleet bases and the surface forces will be attacked in the first hours after the declaration of war. Each side will seek by this means to obtain success by a surprise attack at the start to throw the enemy mobilization plans into confusion, as was done by the Japanese against the Russian fleet in their torpedo attack at Port Arthur in 1904. "Therefore the aerial weapon must be held in readiness both for attack and defense from the very start, since this force, owing to the rapidity with which it can be prepared and employed, is best adapted to serve as a covering force for the advance (force de couverture)."

Also, in the operations of the surface forces against the enemy coast a new factor must be taken into consideration—as a result of the enemy air reconnaissance these operations will be deprived of the element of surprise and the attacking fleet will be exposed to counterattacks by the enemy bombers and torpedo planes. The situation will become especially serious if the bombardment is not simply a demonstration but is to serve to cover the landing of troops to occupy the enemy territory. Superiority in the air will therefore become a prime requisite for such undertakings, and in particular during the progress of the operations effort should be made to obtain something in the nature of command of the air by the employment of airplanes in echelon formation. If our own aircraft bases are too far removed or if the fleet is lacking in aircraft carriers, the situation can only be remedied by the establishment of auxiliary or temporary airports from which the aerial force can operate during the time the operations are in progress. The airplanes themselves may be used for the surprise landing of troops in connection with such undertakings, for example, to form a bridge for subsequent operations on a larger scale. Too much, however, should not be expected from undertakings of this nature, since 100 airplanes can not land more than 2,000 infantrymen, with very little equipment and with no artillery of any kind—a troop which would be incapable of anything more than a raid. At the same time this factor must be given serious consideration since a force of even 200 men landed from about 10 airplanes are capable in a surprise raid of accomplishing much damage in one or two hours by the destruction of important lines of communication, bridges, canals, locks, tunnels, electric plants for railways, etc. Thus all artificial structures of this nature require direct protection from such possible raids. In such cases the best defense will be found in the employment of airplanes for combating such raids.

The effectiveness of the seaplane in naval warfare does not lie so much in its fighting qualities as in its usefulness for scouting and

reconnaissance. Although it lacks the property of the ship in being able to remain for long periods in a certain observation zone, it is still capable of making a rapid survey of very extended areas at sea. Had the sole observation plane which took off from the English aircraft carrier before the battle of Jutland pushed on to the southward instead of remaining over its own cruisers, Admiral Jellicoe would not have remained for so many valuable hours in ignorance of the whereabouts of the German high seas fleet. The events of the battle would have taken a different course, in all probability, had Admiral Scheer been able to receive information from his own Zeppelins on the disposition of the English fleet. It is extremely difficult, even for the side possessing superiority in the air, to shake off an enemy which is maintaining contact with the surface forces, and from this it follows that in the future the commanders of the surface forces will be fully informed with regard to the strength, disposition, and course of the enemy surface force long before the cruiser screens have made contact. "The aerial reconnaissance of the future will have the great advantage of preventing a premature clash between the opposing surface forces—the leaders will therefore not be bound to any course of action and will retain their freedom of action." But even under these conditions the cruiser reconnaissance does not lose its importance, since, as we have seen from the example at Jutland, occasions will arise when atmospheric conditions effectively prevent aerial reconnaisance of any kind. Further, the information supplied by the aircraft is frequently as much in error with regard to the position and strength of the enemy forces as in the reports from the cruisers. In any event it is advisable to supplement the information received from the scouting planes by reports from the cruisers where practicable. In particular, the tactical scouting of the cruisers, which is undertaken immediately preceding the actual battle, can not be taken over by aircraft.

The value of the seaplane lies more in its ability to perform effective strategical scouting or reconnaissance, since these craft are able to obtain a general survey of large areas in a short time and can gather information regarding the distribution and movements of the enemy forces within these areas even though opposed by strong enemy air squadrons. On the other hand the possibilities of aerial reconnaissance off the enemy coast and over fleet bases should not be overestimated, since the planes will be forced to maintain a great altitude by the enemy antiaircraft batteries and countermeasures, and can therefore only obtain a superficial view of the situation on which to base a report.

Summarizing, Castex assumes that the effectiveness of the airplane in battle rather than in reconnaissance will be the factor

which will alter the character of the strategy in actual fact. In particular, such navies which are incapable of ever attaining command of the seas, owing to their great numerical inferiority in surface craft, nevertheless will possess in the airplane a means of activity which will release them from the bondage of the defensive and permit them to make aggressive attacks on the enemy communications, ships, and territory. "Making use of these aids, the strategic defensive will find possibilities which did not formerly exist. Even though this weapon is incapable to-day, as formerly, of bringing about a decision, it still furnishes a means of giving the hostilities in certain theaters of war a hitherto unknown character and the inactivity and complete submission to the will of the enemy can thus be avoided." All in all, the ship remains the outstanding factor in naval warfare, since a new weapon only renders the old weapon superfluous when it is capable of accomplishing the same purpose in a better manner. This however is not the case with the airplane. It can only render its best service in conjunction and in cooperation with the other means of war on the seas. Still, it must be granted that great progress has been made. The submarine remained simply a ship and consequently its field of activity remained the same, but with the advent of the airplane an entirely new field of action was opened up, as new as the weapon itself. "This sword of Damocles, hanging hereafter in the skies over the heads of the belligerents and beyond the reach of their power, will exert a tremendous influence on all that takes place on the earth beneath." In the navy, the surface forces will only then remain as the predominant factor when they have succeeded in adjusting themselves to this new technical achievement—this both in respect to the operations and the organization as well as the construction and composition of the fighting ships. The freedom of action of the latter can only be assured where the inferiority in the air is not too pronounced. Just as on land the most efficient infantry can not accomplish much without the support of the artillery and vice versa, so to-day the same relationship holds between the air force and the surface force. Within certain limits and to the advantage of the latter, the former must be kept to as great a number and as efficient as possible. In this connection the law holds which Castex designates as the "pluralite des milieux." Only the side which is capable of following the enemy in all space—over land, over seas, and in the air—will be able to conquer. If one's own forces are inadequate for the purpose, then one must seek allies who possess the necessary forces to supplement one's own. This was true formerly of the forces afloat and on land, but it holds to an even greater extent for the

forces in the air, since in this case the contact between the two is not along a line but at a surface, and is therefore more extensive.

With these considerations he closes chapter 7, on the "theories strategiques." The reader will feel grateful to the author for the fact that he has dared as the first to present a fundamental study of the important and much disputed question of the air factor in naval strategy. His attempt in the last chapter to present a complete example of naval warfare on the basis of an assumed situation and assumed positions on the chart must be left to the study of the reader.

THE NAVY'S RESPONSIBILITIES

A lecture delivered at the University of London by Admiral Sir Richard Webb

The first lecture of the course of advanced lectures in military studies at the University of London was given at University College, on April 29, when Admiral Sir Richard Webb spoke on " The Navy's Responsibilities."

Sir Richard Webb began his lecture by stating that the war-time objects for which the navy exists are to insure unimpeded use of the sea to our merchant shipping, to bring economic pressure to bear on the enemy, to cover the passage of our army, and to prevent invasion.

He laid emphasis on our (England's) dependence on overseas supplies, pointing out that this country lived on the barest margin—not more than six weeks' supplies of food and other essentials being in the country at any one time.

He then referred to the vital question of fuel for the navy. At the present time the navy was driven by oil and the oil used was well oil, all of which had to be brought from overseas, and its safe transport was a very grave responsibility. Two alternatives to well oil had been suggested. Firstly, there was powdered fuel, which could be made from any grade of coal, but which had not a sufficient calorific value to be used in high-powered ships. Then there was oil produced from coal. This would be highly uneconomical unless production was on a very large scale. The plant for its production must be located near coal fields, near ports, and near large towns in order to insure the greatest economy in production. It had been estimated that, working on a scale commensurate with the navy's requirements—750,000 tons of oil annually, which would mean the treatment of 20,000,000 tons of coal—it could be produced at a cost of 50s. a ton, as against 42s. a ton for well oil. When it was considered that it would not only obviate the difficulty and cost of bringing the well oil to this country, but also the great cost of safeguarding our present sources of supply, it was obvious that it would be a great gain to the nation.

OFFENSIVE ACTION

Sir Richard Webb's next point was that decisive results could only be obtained by offensive action—this was true in Nelson's time

and it was still true to-day—and that was the primary task for our main fleet. For that purpose bases near enemy ports were essential, and the main fleet would have certain requirements in cruisers, destroyers, and other light vessels.

In addition, there was the question of direct protection of our sea communication. For this there were only two methods worthy of consideration. First, operations against raiders, in which our squadrons would have to seek out and destroy the raiders, merchant ships would have to be armed in self-defense, and enemy bases must be captured or destroyed. Dangers from submarines and aircraft in narrow waters could not be ignored. The second method was the convoy system, which would need large numbers of cruisers and destroyers for escort. In this connection, Sir Richard—like Sir Herbert Richmond in his lecture to the British Empire League on April 22—expressed grave doubts whether the postwar disarmament pacts had left us with the necessary numbers.

Next Sir Richard spoke of economic pressure on an enemy, which had always been one of the main weapons of a maritime nation. At Geneva the question of the "freedom of the seas" had been mooted, but for a maritime nation to agree to such a proposal would be to "gain a shield but relinquish a sword." He thought it doubtful whether any great maritime power would ever forego the right of economic pressure, which was enjoined by the League of Nations.

In naval warfare it was essential that the enemy main fleet be either contained or destroyed, as otherwise the passage of an army overseas would be impossible. The danger of invasion was a similar problem.

INTERNATIONAL COMMITMENTS

Sir Richard then referred to our international commitments. First, for prevention of war, in which connection we were committed under the covenant of the League of Nations and the Locarno treaties to action in certain conditions. Then there were the disarmament treaties, the results of which had left grave doubts in naval circles as to whether we had secured a number of cruisers and destroyers adequate to our peculiar needs. There were lessons to be learned from these pacts and treaties. The danger of war had been lessened, but it still remained. But the strategical drawbacks to standardization of fleets was the crux of our naval problem. So far the only panacea for the race for armaments had been the "yardstick," and its convenience was purely political. The psychological effect of these continued reductions on the morale of the navy could not be disregarded.

In dealing with the question of the composition of the navy, Sir Richard pointed out that there had been a steady reduction in the

size of capital ships since 1923. He thought it probable that the limit in future would be found to be well under 20,000 tons. The value of a large number of huge battleships, with attendant vessels, tied to bases, watching an enemy battle fleet, while enemy cruisers raided our communications, was very questionable. The last word in this matter would have to rest with the strategist and not with the constructor. In regard to cruisers, the lessons of the war pointed to a smaller class than the 10,000-ton vessels allowed under the Washington treaty, but the numbers were insufficient. Destroyers—like cruisers—were insufficient in numbers, although we supplemented them with sloops and "P" boats. A vessel, the possibilities of which he did not think had yet been fully grasped, was the large flying boat, but there were administrative difficulties in its use. He would like to see all naval aircraft administered by the admiralty.

Admiral of the Fleet Lord Jellicoe, who was in the chair, then spoke for a few minutes. He referred to Sir Richard Webb's remarks on oil from coal, and commended its use as a solution of a serious problem. He stated that the normal stock of oil in this country for the navy's needs was four months' supply, but at one period during the war we were down to three weeks' supply and he had had to issue an order that no class of vessel was to steam at more than 20 knots unless in sight of the enemy. He concurred with Sir Richard in his grave doubts as to whether we had had left to us, under the various peace pacts, a sufficient number of cruisers and destroyers. And he also referred to the inevitable effect on the morale of the navy when, through repeated reductions, officers who had entered the service with a reasonable expectation of making it their life work were cast ashore between the ages of 30 and 40 with little hope of obtaining any other employment.

FRANCE AND ITALY IN NORTH AFRICA [1]

By Major O. Welsch (retired)

[Translated from Marine-Rundschau, March, 1931]

France within the last hundred years has created for herself a colonial empire, which reaches from the Mediterranean to the Gulf of Guinea and from the Atlantic Ocean to the watershed of the Nile, which comprises 13,000,000 square kilometers with a population of 60,000,000, while the motherland contains only 500,000 square kilometers and 40,000,000 inhabitants. If you look on the map at this " France d'Outre Mer " or " France Prolongée "—that is to say, extending across the " Bight of the Atlantic Ocean," as the Mediterranean is called by French writers—and convince yourself that the city of Algiers lies in the same longitude as Marseille, that the Niger Bend and Timbuctoo are in the same longitude as Paris, and when you think that in a few years the Trans-Sahara Railway will connect this enormous territory with the metropolis, a " Gallic India " lying at her doorstep—it almost looks as if all this were part of a brilliant piece of statesmanship and the result of profound political wisdom and foresight. And yet it is anything but the fruit of a bold, far-sighted plan. It is the painful consequence of a whim, such as chance has not often introduced into the pages of history.

When the political systems of Europe began to expand into a world system, France also played her part in the exploration and political colonization of the earth. Her Atlantic coast, in accordance with the laws of political geography, secured for her a transatlantic colonial empire in America. But the latter could not survive the rivalry with England. Napoleon sold the last bit of territory to the United States. In 1803 " New France " had again disappeared. After the tempestuous storms of antiquity and the middle ages the Mediterranean at that time lay a little off the beaten track of world politics, calm and peaceful as is proper for an inland sea. North Africa was in a state of vassalage to the weak Porte. The idea of the " Near East " was not yet born. The thunder of the guns of Aboukir was the first faint indication of the future importance of these shores, whose inhabitants contented themselves with trade and navigation along the coast—and kept on fighting with the pirates of the Barbary States. English and French, Dutch and American warships previously had always only gained momentary successes. Polignac negotiated for years with Mehmed Ali regard-

[1] See also the articles in the Marine-Rundschau, 1929, pp. 63, 110, 167; 1930, pp. 408, 462.

ing a joint action of pacification without getting any results, until chance brought about that dramatic scene in the castle of the Bey of Algiers, in the course of which the latter struck the French consul in the face with a fly-whisk.

Now France had to act willingly or unwillingly. At first this action took the form of a feeble blockade, which lasted three years. Then, when her prestige urgently demanded it and energetic action could no longer be avoided, one day an expeditionary force of 40,000 men sailed from Marseille, landed on the Ferrush Peninsula, and 20 days later marched into Algiers (July 5, 1830) without meeting with any resistance worthy of mention. The nucleus of the " Greater France " came into being almost against the will of the smaller country. At Paris the value of Algiers as an important gateway for entering Africa was still entirely unrecognized. During the Second Empire French rule was established and strengthened only with great reluctance and unwillingness. The process was marked by many incidents and crises, and the matter was not finally settled until the Third Republic, when (1881) France succeeded in also gaining control of the adjacent Tunis by a treaty establishing a protectorate. Nevertheless, even then no one thought of a further extension of French influence toward the west, much less of any connection with the countries along the Senegal—where France had already gained a foothold. On the contrary, attempts were still being made to maintain the French position in Egypt and on the advice of Gabriel Hanotaux the French marched from Niger to the east—right into the Fashoda incident (1898). But this turned out to be a blessing for France, for it ultimately led to the great Anglo-French barter of 1904, as a result of which the western half of the Dark Continent was assigned to France. And from that time on events spontaneously impelled France toward the concentration of all her colonial efforts upon that region.

At the beginning of the century there appeared a book entitled " Lâchons l'Asie—Prenons l'Afrique! " in which it was proposed to offer Indo-China to the British in exchange for Nigeria. Gradually the outlines of a greater France were beginning to appear beyond the Mediterranean. The feeble stand of the German Government on the Moroccan question and British support helped to give it a definite shape by the addition of the large Shereef empire. The theft of the German colonies was the finale, and to-day the watchword of a " France of one hundred millions " has become the common property of the whole nation, a national idea, whose content is regarded as a gift from heaven predestined for France, a fountain of youth for aging France, whose white sons are growing more and more unwilling to be slaughtered for the sake of the imperialistic policy of their statesmen.

The young Italy, like Germany, came too late for the partition of the earth, and for the same reason—because of long-delayed national unity. All the same, in 1878 she came back from Berlin with a sort of Mediterranean program, which was first of all directed toward Tunis—the "prolongation of Sicily" (sketch 1). But this territory was snatched right away from her by France who claimed it as an "appendage to Algiers." Now Crispi tried his luck with a purely colonial program without any national or geographic significance, the fruits of which took shape in Erythraea and Somaliland. It looked as if Italy were about to impose a

SKETCH 1

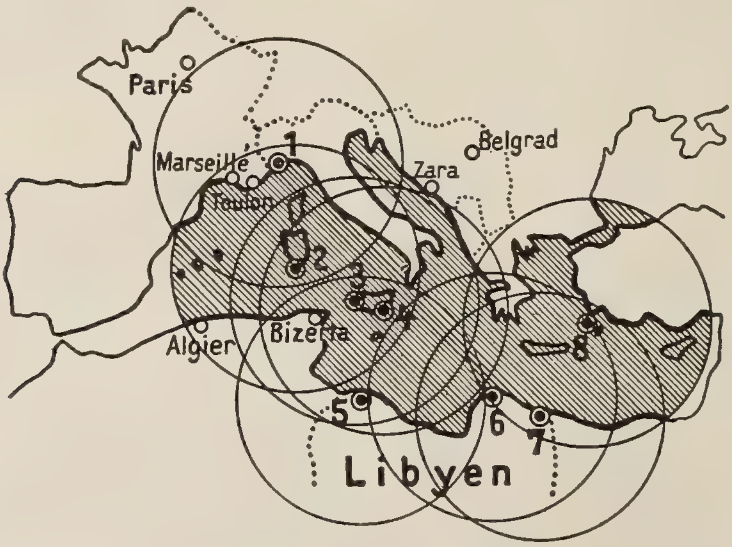
protectorate on Abyssinia, when Menelik suddenly succeeded in again shaking off the shackles at the memorable battle of Adua (1896). Thereupon Italian policy again returned to the Mediterranean. In the meantime, however, England had made herself mistress of Egypt. The only territory still available in North Africa along the coast was Tripoli and Cyrenaica, on account of their geographical characteristics of doubtful value. But since France had made greater and greater progress in the penetration of Morocco, and when in 1911 General Mangin simply occupied Fez, the capital, it was high time for Italy to help herself, if she did not desire to go entirely empty handed.

The occupation of Libya was attended by many a serious crisis. In spite of the Italian superiority, the operations in 1912 had been carried on with but doubtful success. The two Turkish defenders, Enwer in Tripoli and Mustapha Kemal in Benghasi, were plentifully provided with supplies of every kind from Tunis, Greece, and Egypt. And the war might have lasted indefinitely if Italy had not succeeded in setting the Balkan States at Turkey's throat, thereby forcing the latter to the peace of Ouchy, which obliged the Sultan to relinquish his African possessions. But in place of Turkey Italy now had to contend with the Senussi. During the World War the Italian flag only flew over the large coast towns, and even these since 1916 were regularly besieged by rebels under Turkish leadership. Hardly 200 kilometers from the principal city the German submarines had established themselves. In the year 1918 the conquest of the country had to begin all over again.

Nitti and Giolitti seriously considered abandoning the African " sand desert " and started negotiations with the Arabs in regard to self-government. It was Volpi who realized the instability of the situation and, fearing French intervention, reverted to a strong colonial policy, which was continued with still greater energy by Mussolini and imbued with the Fascist spirit. The royal visit of 1928 was the climax of his colonial propaganda. Marshal Badoglio has since carried the Fascist banner right into the heart of the Senussi zone and has not only occupied the rich oases of Kufra, but also Murzuk in Fezzan, which is not very far from the disputed southern boundary of the colony. To-day Italy has a firm hold on Libya. By including the North African coast in her system of defense her strategic position has considerably improved. And not only on the sea and in the matter of defense has Italy bettered her situation, but also with respect to an offensive against Tunis, which is practically defenseless against any attack on a grand scale launched from the Little Syrt, and finally by reason of her military air base, whose western axis, Savona-Sardinia-Sicily, through the three African points of support, Tripoli, Benghasi, and Tobruk, is organically connected with Leros in the Dodekanes. Thus, Italy is able to exercise an almost complete domination of the Mediterranean from the air. (See sketch 2.)

The colonial and economic development of Libya has also made astonishing progress. It is to-day one of the most popular national aims. The excavated ruins of Leptis Magna, the birthplace of the emperor Alexander Severus, has come to be the symbol of the " Fourth Rome " which shall once more dominate the Mediterranean and geographically and politically reestablish the Italian peninsula as a great natural reloading pier for the goods of the Orient. This

desire to expand toward the East also manifests itself in an increased activity on the part of Italy along the Red Sea. Not only has she been able to bind Yemen to her interests by means of a treaty of friendship with important trading privileges and to make Massawah the reloading port for this trade, but she has likewise to the disadvantage of France greatly increased her influence in Abyssinia, the old dream of Italian colonial policy, by the concession of an Abyssinian free port zone on the Erythraean coast (1928) and by a special treaty with England (1926) under which she is given a free hand in the matter of constructing a railway from Massawah via Adis Abeba to the Italian Somali coast. Incidentally this was a



SKETCH 2.—Italian air bases

1. Savona	3. Marsala	5. Tripoli	7. Tobruk
2. Cagliari	4. Augusta	6. Benghasi	8. Leros

Assumed cruising radius: 700 km.

veritable gift of Danae from the hands of England, by means of which she deliberately stirred up the fires of jealousy and envy between France and Italy.

If Italy, notwithstanding, is not happy in her African possessions this is to be attributed solely to the London treaty of 1915, under which, in addition to other political and territorial advantages in the event that the German colonies should fall into the hands of the Allies, Italy was promised territorial compensation in Africa. But France and England behaved very shabbily to Italy in this respect and have tried to buy her off with a tip. Thus France (1919) agreed to a trivial boundary adjustment near Ghadames, while England permitted the annexation of the worthless Jubaland to the Italian Somali coast and (1924) at the expense of Egypt ceded the oasis of Djarabub to Cyrenaica. But Mussolini's ambitions go higher. His plans are based on two theses—a political one and an economic one—which are not without justification. The first one is to the effect that Italy by the occupation of Libya has also acquired sovereignty

over all those inland territories (hinterland) which in 1911 were still under the overlordship of the Caliph and which France took possession of without consulting Italy, merely on the basis of a treaty with England (1919). And the other relates to the circumstances that Tibesti and Borku from ancient times have inclined economically toward Tripoli and that the very ancient trade route from Lake Chad via Murzuk sought an outlet into the Mediterranean at Tripoli.

The Italian claim practically amounts to a corridor to Lake Chad. Or, if the desire for a mandate over Cameroon, which has been repeatedly spoken of, is considered in this connection, Italy is aiming at a division of the Dark Continent into three spheres, and Africa in which, besides a western French and eastern British colonial empire, there is also room for an Italian colonial empire in the center, which would stretch from the Mediterranean to the Gulf of Guinea, an idea which is worthy of a Mussolini and which has taken firm hold of all Fascist imaginations. The "march to Lake Chad" has been for some years on the national slogans, and Italians are already dreaming of an Italian Sahara railway, which, via Murzuk and through Tibesti, is to make connection with the British network in Nigeria. This line would be 500 kilometers shorter; that is to say, less expensive, both as regards construction and use, as compared to the French route. It would be the ideal short cut from the Mediterranean to the Gulf of Guinea, and in an international sense, therefore, of considerably greater importance to the European trader than the railway planned by the French, which after all is mainly to serve only French imperialistic purposes. For France this plan is unacceptable. For one thing, because it would tear asunder her African empire and also deprive it of its proximity to the British Soudan, which even to this day is still indispensable on account of France's traditional policy looking toward Abyssinia-Djibuti, and then as a matter of principle, since France with some degree of justification objects to alone paying the costs of the Italian territorial aggrandizement arising from the London Treaty.

How the dead center of the Franco-Italian compromise may one day be overcome can not be foreseen to-day. The situation is strongly reminiscent of the time when it was a question of dividing Africa into two parts and when Kitchener and Marchand faced each other for months at Fashoda with loaded guns. The Franco-Italian Fashoda of the future perhaps will be located in Tibesti or in Borku. Which will be the party to yield? And will it again be possible to settle the matter by diplomatic means, as then, on the Nile? These are the grave questions which affect the relations between France and Italy in this particular sphere of colonial competition.

DEVELOPMENT OF THE PLAN OF OPERATIONS FOR THE GERMAN BATTLE FLEET

A Supplement to the Article by Captain Weniger (retired)

By Vice Admiral Kahlert (retired)

[Translated from Marine-Rundschau, March, 1931]

(EDITOR'S NOTE.—*The referred-to article by Captain Weniger was reprinted in O. N. I. Monthly Information Bulletin of January 1930–31*).

Captain Weniger in his article on the development of the plan of operations for the German battle fleet, published in the Marine-Rundschau early last year, has discussed a subject which was bound to arouse general interest on account of its important bearing on risking the fleet and ultimately also on the outcome of the war. His account, the first one to be based on official documents, to a great extent clears the leaders of the charge that they were responsible for the defensive use of our fleet in the World War. On the other hand it places the chief responsibility for holding back the fleet on the Admiralty Staff. For the sake of historical completeness, however, it seems to me that there is need for an additional statement, throwing some light on the view held by the Admiralty Staff during the year 1918 as regards risking the fleet. On the last page of his article (page 59) Captain Weniger writes: "As for the rest, he (Admiral Scheer) in the year 1916 was given full liberty in the conduct of his operations but beginning with the spring of 1917 this was no longer the case" and further on "Excepting at the end of the war, the Supreme Command never demanded the employment of the fleet at the risk of destruction, while during a great part of the war it was positively forbidden." These statements need to be corrected to the extent that in the spring of 1918 Admiral v. Holtzendorff, who was then chief of the Admiralty Staff, expressed himself in favor of an active employment of the fleet. The advance of the fleet as far as the Norwegian coast on April 23 and 24, 1918, was even undertaken at his direct instigation.

The offensive in the west in the spring of 1918 caused the admiralty staff to investigate how the fleet might support the operations of the army. The idea that after the collapse of Russia the war might perhaps be decided in our favor by the army without the fleet having had an opportunity to strike (except at the Battle of

Jutland) also had some influence. It would have been obvious to relieve the army by means of an offensive in the Channel, because this would have disturbed the convoy traffic between England and France, which at that time naturally had an increased importance. The bombardment of Dover, Calais, or Dunkirk was also considered. But such an offensive, which in point of time would have to be limited to a stay of a few hours in the Channel, could only afford very temporary relief to the battle front, while exposing the fleet to no inconsiderable danger in the narrow waters in which it was obliged to operate and also during the return at night along the Dutch coast, where it was difficult to dodge torpedo boat attacks. Damages, which were probable, might delay the return at night and the fleet might be placed in a position where it would be forced to accept the battle under unfavorable circumstances. These considerations seemed to speak in favor of a proposal to the chief of the admiralty staff to make an advance in a northerly direction toward the Skagerrak and beyond. There the convoys, which sailed regularly between England and Norway, with their escorts constituted profitable objects of attack. A success obtained there might also aid our warlike operations in the Channel, since it was to be assumed that considerable patrol forces would have to be withdrawn, leaving our submarines more unmolested in their war on commerce in the Channel. An encounter with a part of the British fleet was also within the range of possibility. Perhaps there would be an opportunity of gaining a partial success of some consequence. Even an encounter with the entire British fleet, judging from experience at the Battle of Jutland, might be risked without any special misgivings.

Admiral v. Holtzendorff at that time was in complete accord with these considerations. How anxious he was for prompt fleet activity is shown by the fact that only a few days after this report he himself proceeded to Wilhelmshaven in order to discuss personally with the fleet commander the further employment of the fleet. This conference, which took place on April 6, 1918, in the flagship of the fleet command, S. M. S. *Kaiser Wilhelm II*, in the presence of the members of both staffs, and which was the termination of several previous conferences, resulted in the naval advance of April 23 and 24, 1918, which was pushed as far as the Norwegian waters. The initiative in this case was undoubtedly due to the chief of the admiralty staff, although no special mention is made of the fact in the book Germany's High Sea Fleet in the World War, by Admiral Scheer. No *written* instructions were later issued by the chief of the admiralty staff by way of confirmation. This was really superfluous after the conference with the fleet commander and

would also have been inadvisable in view of the fact that nothing that was put down in writing remained secret. This also explains why Captain Weniger in studying the documents was unable to find any reference to these events, which, in my opinion, are not unimportant in judging the attitude of the chief of the admiralty staff regarding the employment of the fleet.

It must also be emphasized that the instructions given by the chief of the admiralty staff were not limited to the carrying out of a single advance. These instructions were general in character and authorized the fleet commander to repeat such undertakings as often as he thought advisable. They even strongly intimated the active employment of the fleet. It can hardly be maintained that Admiral v. Holtzendorff authorized the fleet commander to employ the fleet only in a limited sense, because he expressed himself against an advance in the Channel. The fleet commander at the time himself recognized the reasons against such an advance in the Channel. General Ludendorff, in a conference with the chief of the admiralty staff on April 8, 1918, at general headquarters, which followed immediately (Admiral v. Holtzendorff on the same evening of April 6 went from Wilhelmshaven direct to Avesnes), took the same standpoint. It was his view that the fleet by advancing in the Hoofden, even with tactical successes, could not bring about an important decision and that it would, therefore, be better to guard against reverses. However, the chief of the admiralty staff would later undoubtedly have given the fleet commander full liberty of action for operations directed against the English Channel if he had been requested to do so and the reasons had been submitted to him justifying such a policy. But this did not occur.

In this connection it might also be of interest to mention that, as far as my knowledge goes, the chief of the admiralty staff entirely on his own responsibility authorized such advances, which meant consciously risking the whole fleet, because sooner or later an encounter with the whole British fleet had to be anticipated, without first obtaining the Imperial consent. It is unknown to me whether he subsequently obtained that consent. The conclusion of the throne report submitted to His Majesty by the chief of the admiralty staff in reference to this naval advance certainly seems to indicate that Admiral v. Holtzendorff did not previously obtain the Emperor's consent. It says: "The undertaking could lead to a decision on the sea. By airship reconnaissance it was protected as far as possible. *I have taken the responsibility for it upon myself*, since such operations are consistent with our present offensive and the British, in consequence, will be obliged to keep strong forces in the north, so that our warfare in the channel will be aided. Such

undertakings are necessary also for keeping the fleet in good fighting trim. They are in agreement with the policy approved by Your Majesty.

Unfortunately, the advance on April 23 and 24, 1918, was unsuccessful, although it extended as far as Bergen. It was the last advance undertaken by the fleet. Presumably the inactivity was caused by the long continued repairs of the *Moltke*, which had been heavily damaged during the advance by the breaking of a propeller shaft, and the fleet commander probably did not wish to do without this vessel in further operations. At any rate he was not deterred by any instructions from the chief of the admiralty staff as regards the employment of the fleet.

MASTERY OF THE SEA IN ITS RELATION TO WORLD POLITICS

By Rear Admiral Lutzow, Rtd.

[Translated from Marine-Rundschau, October, 1929]

In 1815 the struggle which had been dragging along between England and France since 1689, came to an end. England had conquered. Several times the decision hung by a thread. France's prospects were brightest during the reign of Louis XIV. He demonstrated his capacity as a ruler also in the domain of commerce, oversea policy, and the navy by appointing men of talent to the right places. Even England never possessed a greater Minister of Commerce and Marine than Colbert, and his commander of the fleet, Tourville, stands among the best. In 1688 the French fleet was numerically almost equal to the English fleet and greatly superior to that of Holland. Louis, however, underestimated the exhaustion of his forces in land warfare and the necessity of insuring a constant supply of fresh troops from his oversea possessions. During the period from 1661 to 1697 he had waged 22 years of warfare with the important result that he had extended his frontiers as far as the Rhine, the Maas and the mouth of the Scheldt. After this enormous and high-handed rounding out of his northeast boundaries, he stretched out his hand toward the imperial crown as well as toward the Spanish succession. Was this policy correct? Was he right in supposing that because of his dominant power on the mainland, it would also be easy to obtain the mastery of the seas?

First of all the rounding out of his northeastern frontier was not an urgent necessity. Louis found in the Rhenish Confederation, established in 1658, a neutral safety zone against Hapsburg, a borderland territory governed by small German princes, whose lack of influence over the Emperor was equalled by their jealousy of him, than which nothing conceivable could have been more in Louis's favor. The more he became involved in the effort to obtain sole control on the Continent, the greater became the resistance to him. Even the Rhenish Confederation, which was his best support, was dissolved in 1668, since these small states were no more willing than the Emperor to have Louis usurp their rights. His continental policy also brought the sea powers out against him. Would matters have been reversed if he had directed all his efforts toward sea power, toward an oversea policy? Would he not then inevitably have had all the continental states, above all Hapsburg, on his back? One may doubt it. By the continental party, at the instigation of the Elector of Mainz, a well-founded proposal for acquiring Egypt was submitted to Louis by Leibniz. The proposal was designed to divert

him from Europe. Hapsburg would scarcely have placed any obstacles in the way of such an endeavor: she was interested in the Balkans but not in the Mediterranean. Spain, to which Italy was still tributary at that time, was no longer a serious opponent. Mastery of the sea in the Mediterranean, therefore, could very likely be achieved and the prospects for the future that would have been opened up in conjunction with the possession of Egypt, in view of the favorable geographical position of France, are obvious. The continental states, however, would have raised no objection.

Was it otherwise when it came to the extension of power over and beyond the Atlantic? The enormous extension of France from Canada (St. Lawrence River) to the mouth of the Mississippi, an extension of power which entirely encircled England's small fringe of coast in North America with a broad girdle of hinterland, no European continental state endeavored to prevent. Spain, Portugal, and Holland were too weak, Hapsburg, the German Imperial States, and Italy were not interested. Just as the sea powers were more happy than anxious when the German Emperor extended his territory toward the southeast and acquired Hungary, the latter would have felt relieved if the state under Louis XIV that had been so systematically exalted by men of genius had turned its attention away from its continental neighbors and directed it toward regions in which Hapsburg and Germany had no interests, nothing of value, and no ambitions.

Louis XIV did not do this and by overstraining his powers in a direction in which he could not attain his goal, inaugurated the decline of France whose rise had been so brilliant and auspicious.

The period from 1815 to 1870 is a comparatively tranquil one in world politics. Internal political questions come to the fore, equilibrium on the continent is carefully safeguarded, England is undisputed mistress of the seas and is building up her colonial empire in Africa, Asia, and Australia. In the sixties, however, the picture changes. Two new great powers arise in Europe, Germany, and Italy; the United States put down the danger of a division by the Civil War of 1862–1865, and Japan is acquiring European culture after her internal revolution. In these new states the power of the people and the elementary will to live is pushing outward and, just as in the effort of the older states to expand, comes in contact with England's mastery of the seas.

The opposition between England and Russia [1] continues throughout the entire century. The association in the Turkish-Greek War of 1827 and the agreement of 1907 change nothing in the picture as a whole. The surfaces of friction change. At times they lie in East Asia or in the Pacific Ocean, as in the time of Alexander I who dreamed of the occupation of the Hawaiian Islands, of a mo-

[1] See Bartels' England und Russland, einst und jetzt. Marine-Rundschau, 1926.

nopoly of commerce in East Asia for his Russian Trading Company and who wanted to intervene against the separation of the South American countries from Spain, whose plans however failed because he could not compete with England at sea; and so again at the turning of the century, when, after the construction of the Siberian Railway and the occupation of Port Arthur, Russia endeavored to extend her power into Manchuria and Corea. It is realized that to carry out this policy a fleet will have to be stationed in East Asia, but instead of employing it in the war with Japan, England's ally, the mastery of the sea route from Japan to Corea is left in the hands of the enemy, a mastery which was an unconditional preliminary for the conduct of war on land and thus for the victory of the Japanese.

Still stronger and more persistent appear the frictions in inner Asia which became constantly sharper through the conquests subsequent to the Crimean War and not unfrequently are associated with the situation in East Asia. Their intensity is well known but they can only be indicated here. Lieutenant General Kabisch characterizes them according to his investigations as the principal cause for the entrance of England into the World War.[2] In the light of this assertion, England's Dardanelles expedition in 1915 also acquires a double meaning.

The mastery of these straits, the right of free passage of warships, is the question about which the tension between England and Russia has always been greatest from remote times. Nicholas I, in 1833, compelled Turkey to permit Russian warships, and these alone, to use the Bosphorus and the Dardanelles, but in 1841 England put a stop to this position of preference. In the Crimean War, 1854–1856, Russia's pressure toward Constantinople was again checked by the "sea powers" England and France. The adventurious expedition to the Crimea and the reinforecement of the besieging army which was gradually increased to 175,000 men, could be carried out only because the Western Powers had undisputed mastery of the sea. In 1878 Russia had to renounce what she had gained by the Peace of San Stefano, partly because England had sent a fleet to Constantinople.

Although in the period which now followed Russia endeavored to extend her territory chiefly in the Far East, Russian policy still looked with lively interest upon Constantinople and the Mediterranean.[3] In 1896 the proposition of Ambassador Nelidow in a Privy Council "to create incidents which would furnish the right and the possibility of occupying the upper Bosphorus" was approved. In the Franco-Russian Alliance, "Constantinople and the straits represent the counterpart of Alsace-Lorraine." Constantinople and the

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[2] Wissen und Wehr, September, 1927.

[3] Deutsche Rundschau, February, 1927 (G. Frantz).

straits was above all the aim of Iswolski. From 1906 on he was Minister of Foreign Affairs, and in 1910 became ambassador to Paris. In November 1911 he requests from France the recognition of "Russia's freedom of action in the straits." France can not grant this freedom unreservedly out of consideration for England. In 1909 Russia and Italy agree upon a mutual Tripoli-Constantinople guarantee. In the Balkan War of 1912 the ambassador at Constantinople is instructed, in case of a threatening movement by Bulgaria, to call the Black Sea fleet to Constantinople without consulting St. Petersburg. In 1913 Sasonow once more discusses in detail in a memoir the question as to whether Russia is to make any further effort towards gaining possession of the straits. He favors the idea because the economic fate of South Russia depends upon their possession. Armaments are necessary under all circumstances, he maintains, since the question can be solved only through European complications. It is hoped that from 1917 on Russia will be strong enough to take a hand at will. After the discussion with the British Minister of Foreign Affairs Grey in Paris regarding a naval agreement, however, "it is decided to utilize the war, even if it breaks out sooner than desired, for gaining possession of Constantinople and the straits." The illusion that England was seriously renouncing influence in that quarter lured Russia into the World War which England, for the most part, viewed not unwillingly because it would serve to weaken Russia which was becoming dangerous. Apparently this idea also had a bearing on the plan for the Dardanelles expedition.

Churchill explained its origin by declaring that early in September, 1914, he feared an attack by Turkey against the Allied Powers and Greece, which had just offered to join them, and had considered it necessary to take measures in opposition thereto.[4] This does not sound very convincing, less so than the interpretation according to which England intended to make her control over the Dardanelles secure in case Russia should advance toward Constantinople. This also explains the haste with which the Dardanelles expedition was carried out and the force with which he urged a Balkan alliance between Bulgaria, Serbia, Rumania, Montenegro, and Greece under England's guidance. The Russians evidently placed no trust whatever in the English. When considering the surrender of the project, the Russian representative, General Shilinsky, reported to St. Petersburg: "I favored complete evacuation, as I did not desire the creation of a permanent English post, a new Gibraltar, at the outlet to the Mediterranean." While in earlier Russian statements only the economic importance of the straits was discussed—which certainly was deeply felt immediately during a temporary closing of the straits in 1912 by the grain exporters—Shilinsky here emphasizes

[4] The World Crisis, I, p. 376.

the general importance of Constantinople as a counterpart of Gibraltar. Russia as master of the Dardanelles, would have so seriously threatened England's line of communication with India that in case of complications in or about India the sending of reinforcements there would have been rendered extremely hazardous. The more critical her relations with Russia became the less could England permit this.

If the straits were thus the focal point of the opposition between England and Russia at which the war against the Central Powers also reacted upon Russia in a highly desirable manner, the same is true of the "hunger blockage." "Everyone who carefully followed the development of the situation could see that the distant blockade exercised against the Central Powers at the same time was exhausting Russia's forces, since this country even at the beginning of the war was greatly in need of the most important industrial products" writes the Russian liaison officer with the English fleet.[5] Not only the direct effects of German arms are bringing Russia to her downfall, but also indirect influences; the inconspicuously operating means which the mastery of the sea places in England's hands in order to weaken her most dangerous enemy under the mask of the Allies.

Still more difficult to understand than England's behavior toward Russia on the grounds of the natural conflict of interests, which appears with especial clearness in the question of the straits, is her attitude toward the United States since the separation of the latter from the mother country.[6] While at first glance it may seem plausible that England, when the War of 1812 broke out with North America, could not devote herself to this matter with sufficient energy owing to European complications, and was thus unable to put down this new "rebellion," it does not constitute a valid excuse. The Navy of the United States had been so neglected that by an energetic conduct of the war England would certainly have been able to gain a foothold in her former colonies by the aid of her fleet. Instead of this all that she did was to destroy American commerce in all seas, but this naturally did not prevent commerce and an American merchant fleet from springing up again after the war and from assuming by the middle of the century second place, immediately after England. Once again, in the American Civil War in 1862–1865, an opportunity presented itself to recover the influence in North America that had been lost almost 100 years before. The North was fighting to preserve the Union, the South for separation from and independence of the North. England naturally sided with the South, but so feebly that the North was able to impose its will upon the South. This happened because of the fourfold superiority in

[5] v. Schoultz, Mit der Grand Fleet im Weltkriege, p. 51.
[6] Meurer, Der Aufstieg der Vereinigten Staaten zur Grosssecmacht, Marine-Rundschau, 1928, p. 385.

men and the many-fold superiority in all material supplies which the South could not make up by importations overseas because her coasts were blockaded more effectively from year to year. As early as September, 1862, the leader of the Southern armies, General Lee, was forced to report to headquarters in Virginia that his army could not make an advance on Maryland owing to the lack of means of transportation, clothing, above all shoes, and ammunition (Henderson, Jackson, II, 203). In spite of its great superiority in military efficiency, the South was doomed to exhaustion because the importation of new force was prevented by the blockade. This was exercised by the Northern States with the greatest disregard for neutrals.

The English Bermuda Islands, from which English merchant ships broke through the blockade and carried war materials and food to the Southern States, were at times blockaded as if they were hostile territory. In 1863 an American warship even fired upon an English merchant ship in the open sea; in short, the Northern States extended the blockade as it were all the way to the coasts of neutral States. England, therefore, would have had sufficient cause to take a hand in America. Why she did not do so, whether concern for Canada, concern for the too great influence of Napoleon III, or whether the failure of England at that time to understand world politics played the greatest part in determining her line of action, will not be discussed here. Two facts, however, should be mentioned, namely, that the blockade and starving of the Southern States was the unconditional preliminary to their subjugation. The complete conquest of the entire territory, part of which was very inaccessible and embraced 2,000,000 square kilometers, hence four times as much as Germany, was a practically impossible task for the 22,000,000 inhabitants of the Northern States with their lack of military equipment and experience. The second fact is that England, through an active participation in the war with her fleet, could easily have succeeded in holding the Northern States in check and in rendering the blockade ineffectual and thus decisively influencing the war by bringing about the division of North America. By not using her sea power England, in the opinion of D. Schaefers, "let slip the last opportunity permanently to safeguard her position as a world power in America alongside the United States." Thus not only their internal and economic reconstruction after enormous sacrifices in life and property, but also their political expansion (Alaska, 1867; Hawaiian Islands, 1897; Cuba, the Philippines, and Guam, 1898) takes place without any opposition from England; indeed, in 1895 North America even threatens England with war unless she submit her disputes with Venezuela to a court of arbitration. The outcome of the World War strengthens this state of affairs between England and North America. The Washington conference of 1921–22 proclaims with its equalization of the American and English navies that, broadly speaking, we are already approaching an "equilibrium on the seas" or—diplomati-

cally at least—have already attained that equilibrium which France did not succeed in establishing in 150 years of opposition to England. The effective grounds for this development lie in the outcome of the American Civil War, which was decisively influenced by the maritime supremacy of the Northern States in Southern waters, and in the severe shaking up which England's control of the sea experienced in the World War through the German fleet.

On various occasions since 1815 France has endeavored to carry out an oversea policy. As soon as she comes in conflict with England's interests, however, she has to yield, as she has nothing equal with which to oppose her sea power. So it happens several times in Egypt, in the 30's in the war of Mehemet Ali against Turkey, after the building of the Suez Canal and at Fashoda in 1898, and so Napoleon III in 1867 has to surrender the Mexican expedition owing to the uncertain attitude of the sea power, England. No internal necessity for a policy of this kind existed for France in all these cases other than a desire for power; neither a great increase in population nor the dependence of the country upon vital overseas products, nor an extraordinary development of her industry made such efforts toward expansion urgent. With her political needs and interests, her colonies in the East, Cochin China, Cambodia, Annam, Tonking, as well as Madagascar, therefore play no essential rôles. Her chief interest lies in the great North African colony which she has acquired by intelligent effort since 1830 but which to-day has its principal purpose in the reenforcement of the army at home so that, supported by superior land and air forces, the mother country can carry out her European policies on the continent. To accomplish this, control of the sea route from Africa to the southern ports of France would therefore suffice. The nearness of her colonial possessions and the consequently limited protection needed for her sea routes obviously strengthen France's position. This condition, however, is minimized by the fact that the sea route is not only flanked by Spain and Italy, on the mainland as well as on the outlying islands (Balaeric Islands, Sardinia), but also by the English bases of Gibraltar and Malta. The lines of force of different powers having overseas interests thus intersect in the western Mediterranean and control of the sea there, even though owing to England's dependence upon France this is not generally known at the present time, still remains a noteworthy point of contention in world politics.

Germany was first drawn into world and sea power politics in the eighties. It is well known that Bismarck did not first look with favor upon the acquisition of our African colonies, but according to his own words waited for the nation to make the first move before he placed them under the protection of the Empire. But even though his thoughts continued to be directed chiefly toward the European Continent, he nevertheless did not undervalue the im-

portance of the control of the sea routes. In 1884 he said on one occasion to the French ambassador De Courcel: "What I am endeavoring to accomplish is the establishment of a certain equilibrium on the seas."[7] He stated to Admiral v. Tirpitz at the time of his visit in 1897, in spite of differences of opinion as regards details of the proposed first Fleet Law: "You do not have to convince me that we need a larger navy," and also confirmed this acquiescence in writing. It is not correct, therefore, to represent the upbuilding of the German fleet as something which was contrary to Bismarck's view. It is scarcely conceivable that Bismarck in the face of our great increase in population and the consequent extension of our interests on and beyond the seas, could have conceived of safeguarding the same only by agreements and not also by military measures—that is to say, by a fleet. The sense of insecurity which lay at the bottom of the upbuilding of the German fleet is only another name for the equilibrium at sea which Bismarck also wished to bring about. It does not seem necessary to discuss to-day the opinion which prevailed at an earlier date that the upbuilding of the German fleet forced England to go to war. The published documents show that it has been used only to create sentiment. That the incentive for the World War lay in France's efforts to recover Alsace-Lorraine, and Russia's to get control of the Dardanelles, has already been alleged and just recently again affirmed in H. Delbrück's latest and well known publication.[8] Delbrück furthermore shows in this article that not one of the charges which seek to fix the responsibility for the war on Germany contains anything that must be interpreted as indicative of "an inordinate desire to rule or love of conquest" on the part of Germany or Austria. But since the upbuilding of our fleet has been suspected of being just such an outward indication of a boundless policy of conquest, Delbrück's statement contains the indirect proof that no one among the leading men of the enemy governments has seriously believed this. Delbrück does not even mention the upbuilding of the fleet.

In the World War, thanks to her fleet, Germany held permanent control in the Baltic and thus assured the importation, above all, of the vitally necessary metals from Sweden and prevented the adequate importation of war materials to Russia. In non-European waters England and her Allies maintained control of the sea. In the waters surrounding England and the Mediterranean this control was contested. On the surface the enemy fleets were indeed able to exercise supervision over the sea routes, but they could not prevent the German submarines from making France and England ready for peace[9] in

[7] Kreuzzeitung, 20. 8. 18.

[8] Preuss. Jahrbücher, July, 1929.

[9] Compare the public statements of the American Admiral Simms, of Father Laiber in the "Stimmen der Zeit" (1921), and of Ambassador Count Wedel (Hamburger Nachrichten, July, 1919).

1917, through the effect of their activities against commerce and they probably would have forced them to make peace in 1918 or 1919. It may therefore be said that the German submarines to a certain extent at times held control of the sea and had supervision over the trade routes to and from Great Britain and in the Mediterranean. The opinion that the submarine war on commerce caused the United States to enter the war, if it is correct, is an especially clear example of the influence of sea power on world politics. The well known conversation between Wilson and Senator McCumber (summer of 1919) and the speech of the journalist Stephen Wise who accompanied Wilson to London in the winter of 1918–19, show that the Government of the United States intended to enter the war as soon as the Allied Powers were in danger of defeat. We could not therefore hold our ground without having the United States as an avowed enemy. The latter, however, saw the prospect of victory by the Allies vanish when Russia collapsed and Germany simultaneously resorted to her submarine warfare and obtained thereby at least a limited control in the contested regions of the sea. To abandon her submarine warfare therefore meant, even in the eyes of the Allied Powers, the renunciation of an honorable peace.

The expression "world politics" has for many contemporaries an evil sound and is at once associated with an unscrupulous policy of aggression and conquest devoid of any underlying vital necessity. Whoever applies this conception to the oversea activities of German citizens subsequent to 1870 and their protection by a fleet and denounces it, must state how he would otherwise satisfy the desire to live and work of the rapidly increasing population. If he can not make any useful suggestions, the fact remains that, whether we would or not, we were drawn into "world politics." What rôle the use of the sea as the great trade route for ships and as the road to colonization has played in the destiny of the nations of Europe, the last few centuries show plainly enough. It is obvious that these relations are not so clear to us Germans as to some other nations. That is because of our historical development and also our training before the war. To mention only one example: By the "Seven Years War," 1756–1763, we understood only the struggle of Frederick the Great with his opponents, but of the simultaneous, world-embracing contest between France and England, which was closely associated therewith, we had no knowledge at all or at any rate had only an imperfect knowledge. Even under the changed assumptions of the period following the war, the conception of the relations between sea power and world politics must be more clearly defined; otherwise we can neither properly judge our own needs nor the actions of other nations.

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O. N. I. BULLETIN

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CONTENTS

FOREIGN INTELLIGENCE "SUPPLY AND DEMAND"

Success in collecting, evaluating, and disseminating foreign intelligence lies in maintaining effectively a constant flow from the sources in the field, the naval attachés, and other collecting agencies afloat and ashore, through the main office, O. N. I., on out to the flag officers, technical bureaus, and other offices where the intelligence is used. The flow, moreover, must conform to the law of "supply and demand" as it applies to intelligence. The flag officers, bureaus, and other offices where the intelligence is used determine the "demand" and O. N. I., with its collecting agencies, exercises the function of "supply."

Close cooperation within this circuit is most necessary. To circulate information for which there is no demand is worse than useless; it results in confusion and waste of time. Unless the demand is understood and anticipated the supply may fail at the time it is most needed. In some respects the process of collecting, evaluating, and disseminating intelligence requires considerable time, and when the emergency arrives it will be too late to get the information desired, or the sources formerly open may then be closed. Good intelligence work, therefore, requires careful examination of the demand factors, in order that the machinery of supply may concentrate on essentials to meet the actual and prospective needs for information.

By this method of giving priority attention to active information it is not intended to discount the value of other types for which there is no immediate prospective demand and which is sent at once to the archives. As opportunity offers, the collection of these latter types should go forward, and it should always be kept in mind that an unexpected turn in foreign relations may make active and valuable what is now apparently information of secondary importance.

In disseminating information from the Central Office of Naval Intelligence in the Navy Department to meet the principal needs or demands, it has been found convenient to divide foreign intelligence into the following four categories according to the uses to which it is put:

Category I. Intelligence for the use of the Chief of Naval Operations and flag officers in making estimates of situations.

This category comprises material for the "intelligence summaries" or "monographs" for foreign countries, and includes information of political, economic, strategic, and tactical significance necessary in making estimates on which to base war plans and naval operating plans.

These estimates for which the monographs aim to supply information range from the political naval estimate involving the decision of the Government to enter upon war operations, the estimate leading to the assignment of the Navy's task in the war, the subsequent estimates determining the tasks of fleets in the different theaters of operations, on down the chain to the estimates of the force commanders afloat in making their respective plans to combat the enemy.

This is a large order, and even an approximate approach toward the compilation of satisfactory monographs requires continuous effort in the work of building up, replacement, and improvement.

Only a few general rules can be formulated to guide the make-up of these monographs. Too many variables enter to permit set forms and standardization. The information required for the estimates to be made in the event of a war with a major naval power would be quite different from that needed in planning blockade and occupation measures to be used in case of necessity against some one of the countries within the strategic area of the Panama Canal. Other variations of treatment are found in the cases of the more remote European and Asiatic countries which possess little or no naval power. It follows, therefore, that in the case of any one country the scope and make-up of its monograph is determined by the particular conditions and circumstances attending the political, economic, and strategic situation of that country relative to the United States.

On the other hand, in so far as is practicable, it is important that the monographs should be constructed along similar lines for convenience in classification and for purposes of reference and general use. Certain features, moreover, such as ship characteristics and other statistical data, permit standardized form treatment for all countries. Therefore, a tentative general outline guide for monographs has been drawn up. The purpose of this guide is to assure uniformity in arrangement and also to suggest in a general way the ground to be covered.

The work of compiling and keeping up to date the monographs is done under the supervision of the officers assigned to the foreign desks in the intelligence branch. The naval attachés and intelligence officers afloat are the chief sources of material, and much depends upon cooperation and interchanges on the subject between the desks and the agencies in the field. With the limited personnel on duty in O. N. I. it is important that reports embodying monograph

material should be so prepared that they can be incorporated without change.

Category II. Intelligence for use in establishing high standards of matériel and personnel excellence.

This category includes information supplied to the technical bureaus, fleet training and other offices on the advancement of naval science, and methods of training and operation in foreign navies.

This type of intelligence is demanded to establish standards by which the relative efficiency of our own material may be measured. " Supply " of accurate information to meet this " demand " will prevent one form of surprise in time of war—that of enemy superiority of material.

Here, again, cooperation is important. In order that O. N. I. and the naval attachés may be guided to supply the kind and quantity of information needed, when technical reports are forwarded to the bureaus or offices concerned the latter are requested to evaluate them and make pertinent suggestions for subsequent reports.

Category III. Intelligence for use in congressional hearings and in making special studies on limitation of armaments and other subjects.

The information required by the General Board, War Plans Division, and others making special studies on limitation of armaments and other subjects for various purposes, including international conferences and congressional hearings, comprises a class of immediate usefulness for which there is a continuous demand.

A considerable part of the required supply of intelligence in this category is statistical, and it has been found necessary to prepare and keep up to date the following tables:

(1) Ships:
- Vessels built, building, appropriated for, and authorized.
- Vessels building by the treaty powers for foreign countries.
- Proposed building programs.
- Ships in commission, in reserve, and out of commission.
- Modernization of capital ships.
- Merchant ships.

(2) Aviation:
- Planes and other material.
- Personnel.
- Civil aviation.

(3) Naval bases and stations.

(4) Naval personnel:
- Percentage of officers by ranks.
- Comparative personnel strengths.
- Naval reserves—comparative strength and training.

(5) Budgets:
- National.
- Naval.
- Military.
- Air.

The above list is one that is constantly being modified and added to in order to meet demands for information, frequently urgent and requiring immediate reply.

Category IV. "Combat" intelligence for use in the prosecution of war operations.

This category constitutes the supreme demand made upon the Intelligence Service. In time of emergency all other activities are at once subordinated to the supply of combat intelligence for use in the prosecution of war operations.

This subordination of other intelligence activities, however, does not mean that they will cease. On the contrary, they will be expanded in so far as is possible. In addition, espionage and counter-espionage will then be pressed forward. But all these services will be conducted with a first view to giving assistance in the supply of combat intelligence. The latter includes last-minute information and aims to give the Chief of Naval Operations and flag officers afloat a running presentation of activities in progress. It includes a chart plot for the Chief of Naval Operations of own and enemy movements, together with any collateral information that might influence operation decisions.

In the actual use of combat intelligence the practical methods of handling it are much the same for flag officers ashore—the Chief of Naval Operations and commandants of districts—and for flag officers afloat commanding the operating forces. Whatever the size of the force, whether the Navy as a whole, or a district force, or the Battle Fleet, or a small detachment on special service, an adequate information service is vital to successful control.

In the February-March issue of the O. N. I. Bulletin, "combat intelligence" was briefly discussed and some examples of the World War were given. In the course of the discussion it was remarked that what angle indicating, range finding, and spotting is to fire control the Combat Intelligence Service is to "fleet control." Moreover, just as "fire control" requires a highly developed system to plot, carry on, and project into the future, bearings, ranges, and spots, so does the Combat Intelligence Service for "fleet control" require a similar system with trained personnel to plot, carry on, and project into the future all information received. Mention was also made of some preliminary steps that have been taken toward a more extended participation of the Intelligence Service in our annual United States Fleet war problems, with a view to developing methods and machinery for receiving, digesting, and evaluating information from all sources in order that useful combat intelligence may be furnished promptly to the Chief of Naval Operations and the commanders of forces afloat. Some other aspects of this subject will now be examined.

It is true that information attains paramount importance in war, and therefore combat intelligence methods should be the most highly developed in efficiency. The service of Intelligence, however, is not limited to war operations. As a principle it applies to all forms of human activities. In this connection it is interesting to note that recently the Chief of Naval Operations directed an application of combat intelligence methods for a practical purpose very different from war. This particular purpose was to assist in estimating and planning relief measures undertaken by the Navy on the occasion of the Managua earthquake.

The Director of Naval Intelligence was called upon to plot ship movements on a large-scale chart exactly as would be done in a war operation, and to collect and evaluate information bearing on the Managua earthquake for presentation in concise, convenient form for the consideration of the Chief of Naval Operations to keep before him a running estimate of the situation and to assist him in making decisions to meet the requirements.

To accomplish this demanded cooperation with the divisions of communications and ship movements; also close touch with Marine Corps headquarters and other bureaus, especially Navigation, the Hydrographic Office, Aeronautics, Supplies and Accounts, and Medicine and Surgery. In addition, liaison had to be maintained with the Department of State, the War Department, the Red Cross, the Navy Relief Society, Pan American Airways, the press, and other agencies and individuals involved in the catastrophe.

The development of this " intelligence " feature of a humanitarian project resulted in bringing out points in combat intelligence procedure useful as a part of war training.

This is only one example of the practical application of combat intelligence methods. In the office of the Chief of Naval Operations similar methods are used to keep track of important current events that have political and naval significance. On a large chart of the world there is indicated daily outstanding developments in all countries. As soon as a situation becomes acute and active, involving American interests and the possibility of naval dispositions as precautionary or protective measures, then that particular situation is followed on a large-scale chart with plots of ship movements. Recent instances are the insurrection in Honduras, the revolutions in Spain and Portugal, and the troubles in China.

Also the question has been raised as to whether or not combat intelligence methods could be used to advantage in following the subject of limitation of armaments. Much of the strategy and tactics of war appear in the negotiations. It is a struggle to coordinate conflicting interests and opinions to reach the desired end. Powerful

forces are at work both at home and abroad favoring drastic reductions in the naval establishments. On the other hand, there are also powerful forces that contend for moderation on the ground of prudence and security. The principal fields of action are at the conference tables and in Congress, Parliament, and other council halls of government where the decisions of a country are made. The objective of the activities is international agreement by diplomacy; those conducting the activities are statesmen, diplomats, other government officials, organizations, and individuals; the instruments employed include policies, arguments, opinions, and the agencies for disseminating information and propaganda. Without pressing the analogy too closely, in collating, evaluating, and plotting information to assist in following the course of discussion and development, it might be helpful to treat the limitation-of-armament situation in much the same way as would be treated a war situation.

This completes a brief discussion of the four categories that cover the major demands for foreign intelligence. Obviously there is a certain amount of overlapping in these categories. For example, information about a new type of weapon would be included in the monograph; it would also be forwarded to the technical offices concerned, and in addition it might be needed in connection with congressional hearings or certain special studies. The important thing is to supply the information promptly to all the offices that want it. Success in intelligence work depends upon maintaining this flow of useful information through O. N. I., which operates as a mill grinding in accordance with the law of supply and demand.

GENERAL NAVAL NOTES

JAPAN

THE "TEIYO MARU"

NAVAL AUXILIARY VESSEL

The *Teiyo Maru*, the largest and latest addition to the Japanese naval auxiliary fleet, called at San Pedro, 14 days from Yokohama, May 18. The vessel loaded 100,000 barrels of crude oil account Japanese navy at Associated Oil Terminal. Departed May 21 for Yokohama. Nippon Tankers (Ltd.), in which the Japanese royal family is interested, are reputed owners. Balfour, Guthrie & Co., a British concern, represent the Japanese owners at San Pedro. Vessel was built at Yokohama Dock Yard Co.

The *Teiyo Maru* is rated at 16 knots, but it is reported that for several days on the voyage made 17½ knots and that on trial runs made 19½ knots at full power, Diesel driven.

Space aft is unusually large on poop for mounting a gun. A reinforced platform can accommodate one 6 or 8 inch gun, solid or hydraulic hoist type. Forecastle head is so designed to permit mounting a 3 or 5 inch rifle. Is designed with cruiser stern.

It was reported, but without verification, that there are starboard and port outlets below the water line for torpedo release. Officers' and crew's quarters are finished and furnished in a manner suitable for naval use.

ORDERS PLACED FOR CONSTRUCTION OF TWO TORPEDO BOATS

The Japanese press reports that the Navy Department has placed an order with the Maidzuru Navy Yard for the construction of two torpedo boats "of less than 600 tons displacement each, which is outside the restrictions of the London naval treaty."

It is also reported that it is expected to use electric welding in the construction of these boats to reduce weights so that each may be given a fighting strength equal to at least a second-class destroyer.

CONSTRUCTION OF NEW TANKAGE AT HIRO

The Japanese press reports that underground tanks for the storage of heavy oil for the use of the Navy are under construction at Hiro. Twelve of these tanks were recently completed. These underground tanks are proof against air raids as well as eliminating danger from fire and earthquake damage.

ITALY

ITALIAN CRUISER CONSTRUCTION

Although the Italian press was singularly silent at the time of the laying of the keel of the 10,000-ton cruiser *Pola*, it is now admitted that this took place at Livorno on March 17, 1931, and the statement is made that the ship will be ready for launching before the end of the current year.

The *Pola* is one of four cruisers of the *Gorizia* type, the other two being the *Zara* and the *Fiume*. These vessels have the same beam as the three ships of the *Trento* class, but are 46 feet shorter and have better protection.

The following is a comparison of the principal characteristics of the *Trento* and the *Pola:*

	Trento	Pola
Length	646 feet	600 feet.
Beam	67.7 feet	67.5 feet.
Draught	18.9 feet	20.2 feet.
Standard displacement	10,000 tons	Same.
Horsepower	150,000	95,000.
Speed	35 knots	32 knots.
Parson's turbines	4	2.
Boilers	12	8.
Screws	4	2.
Main battery	8 8″/50	8 8″/53.
Secondary battery	16 3.9″/47 AA	Same.
Torpedo tubes	8 21″ above water	None.
Aircraft	3 seaplanes	Same.
Aircraft equipment	Cagnotto catapult with fore and aft track on deck of forecastle.	Same.

It is believed that the *Pola* will prove more satisfactory than the *Trento*, as the latter class is reported to vibrate badly. It will be interesting to note whether Italy builds any more 10,000-ton cruisers with four propellers.

EDITOR'S NOTE.—The above comparison of the *Trento* class with the *Pola* class shows in the latter a reduction of 46 feet in length while retaining the same beam, an increase in draft of $1\frac{3}{10}$ feet, a reduction in horsepower of 55,000, a decrease in speed of 3 knots, the use of 2 Parson's turbines instead of 4, the installation of 8 boilers instead of 12, and 2 propellors in place of 4. Both classes have the same main and secondary batteries as well as torpedo tubes and seaplanes.

The foregoing indicates that the Italians are getting away from the high-speed idea and concentrating more on armor protection as well as eliminating vibration.

FRANCE

SPEED OF FRENCH DESTROYER

The Monitaur de la Flotte, a leaflet of naval news, in its issue of April 30, 1931, carried the following item:

The fastest ship in the world is no longer the *Bison*, in spite of the 40.6 knots achieved on her trials. Last week, at the Glenana base, the *Albatros* maintained an average speed for one hour of 41.9 knots, reaching at times 43.5 knots. The trials were held in a fresh breeze and with a smooth sea. The required power of 70,000 horsepower was exceeded, attaining 87,000 horsepower without exceeding the estimated fuel consumption.

COMBINED NAVAL AND AVIATION MANEUVERS

The extensive combined maneuvers of naval and air forces in the vicinity of Toulon on May 1 and 2 have been completed with considerable satisfaction to the authorities responsible for their conception and execution.

The maneuvers originated with the naval forces of the fleet and the third maritime region, but all aviation forces based in the vicinity participated. The objective was a test of the coastal defenses in the vicinity of Toulon.

The area of operations covered the Mediterranean coast from Sete to Saint Raphael, with a study of possibilities of combined offensive operations of naval and aviation forces.

The Blue Force, operating from Languedoc, west of the Rhone, carried the attack on the Red Force stationed in Provence, taking advantage of the absence of the Red main body to bombard the arsenal at Toulon by air, and attack the coastal defenses with the light squadrons and their accompanying aircraft.

The night bombardment by Blue (Twenty-first Regiment), favored by good flying conditions, was most successful. The day bombardment by the Eleventh Regiment was not carried out in accordance with schedule on account of unfavorable weather conditions. At daylight, the visibility was very poor and not until 10 a. m. did the atmosphere clear sufficiently to allow the Blue air forces to take off. During this stage of the maneuver a heavy windstorm blew up, but the bombing group reached their objective, and returned safely to their landing fields. The Red Forces apparently failed to bring their defensive air force into play against the day bombardment, undoubtedly on account of the lack of warning of Blue's approach under cover of the low visibility. The Red Forces were able to bring into action only their coast artillery and their antiaircraft guns.

From the point of view of the air forces, the maneuvers were most successful, as the 150 planes that took part in the maneuver all returned to their own fields without a single accident, in spite of the bad conditions obtaining during the day bombardment. Radio communication is reported to have functioned perfectly.

Mr. Dumesnil, the Minister for Air, and former Minister of Marine, witnessed the bombardment of Toulon from a bombing plane, the first out and the last to return. He expressed his pleasure and satisfaction with the organization and execution of the problem, the ability and skill of the aviation personnel, and the quality of the matériel.

FRENCH NAVAL OPINION REGARDING SUBMARINES

One effect of the recently concluded agreement between France and Italy has been to bring forth articles in the press by French naval officers concerning submarines. In addition to the articles noted, Pertinax remarks, in his comment on the Franco-Italian agreement: "However, it need not be disguised that the submarine has fallen in the estimation of naval officers, as the instruments to attack it have gained in efficiency."

The first article noted is by Vice Admiral Docteur, former commander in chief of the French Fleet and now head of the department of naval affairs of Le Matin.

> Have we too many submarines? Have the ideas of our general staff changed on the subject of their employment and their importance? Are we using our submarines as a screen or as money to trade with?
>
> In principle, we have not too many submarines, because it is a fragile arm and of limited employment. To keep one submarine cruising, one must possess at least three—one ready to sail, and another under overhaul. It is wise to expect also losses and important repairs. Submarines cruising under the surface have slow speed and small visibility, and a group of them are therefore necessary to attain a determined objective. These considerations, together with the extent of our coasts, and the number and distance of our colonies, show that the number of submarines provided by our naval program is not excessive.
>
> But a fleet must be harmonious, that is, it must comprise the different categories of ships adaptable to all the missions of war. France must fill a rôle colonial and world-wide, and her navy must be adapted to her policy and not be composed of too large a proportion of elements of local defense. We are speaking of coastal submarines, of which the program provided 29,000 tons. This was not the figure proposed by our superior war council. The amount was augmented under the pressure of badly informed public opinion and by the emotion caused by submarine tactics during the war. The Germans employed their submarines against the merchant ships of the Allies; the results would have been much less impressive if warships had been their only objectives. During its numerous sorties, the Grand Fleet did not have a single battleship torpedoed; it is true that they took all the necessary precautions.

Our naval program comprises 96,000 tons of fleet submarines; well-built ships, well armed, of good speed, destined to act in conjunction with the other naval forces.

Finally, all the navies have under trial large cruising submarines limited by the London conference to the number of three and to a displacement of 3,000 tons each. The satisfactory operation of their motors, of their diving apparatus, will take a certain time. We would be very wrong, if these problems are satisfactorily solved, to allow ourselves to be limited, in 1936, to this displacement and this number. More may be expected from the submarine. Combined with aviation it represents the future.

But we also would be wrong to construct more submarines than we could keep up. They are fragile and costly instruments, requiring a specialized personnel and special shore installations.

It is not only in France that we find an evolution of submarine policy. After having been opposed to its limitation, Italy accepted it at London, then applied it in her naval program. If we had followed the same rule, we would now have 60,000 more tons of cruisers. We would have saved money and our neighbors would not have attained for the light craft a parity which they now wish to extend to all classes.

But having obtained her result, Italy is laying down this year 23 submarines. The explanation of these variations in technical conceptions must be left to diplomacy.

Be that as it may, while leaving all its value to the submarine arm, and by assembling the necessary matériel to begin intensive construction in case of political tension, we can limit provisionally the global tonnage of our submarines. It would be dangerous, however, to accept the figure of 53,000 tons which is proposed by those navies which have assured their supremacy with heavy battleships. It is much more urgent for us to build ships of the line, for we have no more of them.

Writing in Le Figaro, Captain Thomazi, in predicting the figures of the Franco-Italian agreement of March 1, says in part as follows:

It is probably in the matter of submarines that we have made the greatest reductions. This will be repulsive to those armchair sailors who, remembering the enormous losses inflicted by this type of ship during the war on the merchant ships of the Allies, would like to make it the principal arm of our fleet. Our naval programs show the imprint of that policy which has been proved an exaggeration by a more attentive study of the lessons of the war. It led also to an increase of expense which it is difficult to justify. We might, without danger, sacrifice a part of our projects, provided that the essential conditions of our maritime security be otherwise satisfied.

Of these essential conditions one consists in possessing enough light craft to protect our lines of communication, not only in the Mediterranean, but in the Atlantic and in the Channel; the other is to lay down battle cruisers, the first of which figures in the list of new construction prepared by the Ministry of Marine and which will be presented to the Parliament after the conclusion of the present conference.

PORTUGAL

CONTRACTS FOR NEW UNITS OF PORTUGUESE NAVY

Contracts for the construction of 11 of the new men-of-war of the Portuguese Navy, included in the so-called first phase of the naval program, have been awarded to the following shipbuilding yards:

To Odero-Terni-Orlando (Italian), two Class I scouts of 2,000 tons displacement each; speed, 21 knots; armament, four 120-mm. guns (two forward and two aft), two 76-mm. antiaircraft guns, and four 40-mm. guns, making a total of 10 guns for each vessel.

To Chantieri Reuniti del Adriatico (Italian), two submarines of 770 tons surface displacement and 975 tons immersed displacement each; surface speed, 17 knots; immersed speed, 9.5 knots; propelled by two motors consuming heavy oil; length, 63 meters; armament, one 100-mm. gun, one antiaircraft machine gun, six torpedo tubes, making a total of eight pieces of armament for each vessel; and one airplane carrier of 6,100 tons displacement; length, 124 meters; accommodations to carry 15 planes; powerful cranes; armament, four 120-mm. guns, four 76-mm. antiaircraft guns, and four 40-mm. guns, making a total of 12 guns.

To Yarrow (British), four destroyers of 1,400 tons displacement each; speed, 36 knots; armament, three 120-mm. guns, two quick-firing guns, two machine guns, and eight torpedo tubes in two groups of four, making a total of 15 pieces of armament for each vessel.

To Vickers (British), two Class II scouts of 1,000 tons displacement; speed, 16 knots; armament, two 120-mm. guns (one forward and one aft), two 76-mm. antiaircraft guns, and two 40-mm. guns, making a total of six guns for each vessel.

The contracts specify that the vessels to be built by the Chantieri Reuniti del Adriatico must be ready within 26 months, while the other builders must have the units awarded ready within 36 months. It appears that two of the destroyers to be built by Yarrow will be constructed in Portugal in conjunction with the Portuguese shipbuilding firm, Sociedade de Construcoes Naveis.

In addition to the above 11 men-of-war, one Class II scout for service in the colonies will be built at the Lisbon Navy Yard, where her keel is to be laid shortly, and she is expected to be ready for sea duty 18 months later.

The new fleet will dispose of a total of 124 pieces of armament, 80 being guns and 44 torpedo tubes. The new units will be manned by a total of 1,600 officers, chief petty officers, and men.

The payment for the vessel in question will be spread over a period of three years.

NOTE.—For details of building program see page 6 of January-February O. N. I. Bulletin.

BRITISH EMPIRE

REVIVAL OF SOUTH AMERICAN NAVAL DIVISION

Announcement was made in the Admiralty on May 21 of the revival of a South American Division under a commodore. For financial reasons the South American Squadron was withdrawn in 1921, and subsequently the limits of the North American and West Indies Station were extended to include South America and an additional cruiser added.

The reformation of the South American Division should help to strengthen the friendly relations between Great Britain and the South American Republics and to give support to the efforts of the Prince of Wales to assist British trade with those countries.

Captain R. H. O. Lane-Poole, O. B. E., has been selected as commodore in command.

(EDITOR'S NOTE.—Unofficial information indicates that the *Durban* will be flagship. The *Dauntless* is to cruise to South America and the Falkland Islands, July 7, to remain over Christmas, so it is inferred that she will, with the *Durban*, make up the division. Whether or not other vessels will be added later is not known. This South American division will be under the C. in C. at Bermuda.)

H. M. S. "NELSON"

NOTE.—*For obvious reasons, it is important to keep strictly confidential these notes on the "Nelson"*

ENGINEERING NOTES

The steam pressure at the boilers is apparently 250 pounds.

Instead of zincs, electric cells are used in the main condensers to concentrate the electrolysis and to localize it on electrodes.

A salinity system for condensers and feed tanks is installed.

The evaporators apparently have less capacity than 4,000 gallons per hour; otherwise the water supply would be ample.

The fuel consumption in port and at sea is somewhat greater than that in our battleships, although the cruising radius was reported long—to Australia and back.

It is especially noted that the center-line bulkhead consists of 4-inch armor and that there are three 3-inch armored decks over the engineering spaces and 10–14-inch armor over the steamline passageways.

There are two main circulating pumps and two main air pumps for each condenser. There is, however, only one main feed pump installed in each fireroom—no stand-by. All pumps are of the reciprocating type.

The engineering installation is very compact, a shaft horsepower of 45,000, giving a speed of 23 knots, being installed in a total space of about half that occupied in the U. S. S. *California*.

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RADIO NOTES

The radio apparatus of the *Nelson* is located in three radio "offices"—the main W/T office, the secondary W/T office, and the auxiliary W/T office.

Main W/T office

The main W/T office is located on the fourth deck, behind armor, and about half way between the main control tower and the main mast. This station contains the communication office, a transmitter room, and a receiver room.

The communication office is a long, narrow compartment, with a desk the full length. Five to ten pneumatic carrier systems are in this compartment. Communication with the receiver room is through a passing scuttle.

The transmitter room is a space inclosed by a wire mesh screen, access being through a single door fitted with a safety switch. There are six transmitters in this space, as follows:

Main transmitter.—This transmitter employs three 5-kilowatt silica valves in parallel in a tuned grid self-oscillator circuit. The other valves of the same style are used as rectifiers for the 500-cycle power supply for this transmitter. The tube filaments are supplied with nonrectified alternating current. The tubes in this transmitter are air-cooled by means of a special blower which directs a stream of air upward at the base of each tube. This transmitter is used on the main antenna for long-range work, the power rarely being greater than 12 kilowatts, since the British apparently do not like to use the full rated power on these tubes. It was further ascertained that operation is not entirely satisfactory at frequencies higher than 500 kilocycles and that for this frequency a 1-kilowatt quenched gap transmitter was kept available. It is understood that duplex operation is not possible when this transmitter is being used.

High-frequency transmitter.—This transmitter covers a frequency range of about 4,000 to 20,000 kilocycles, using two 5-kilowatt tubes in a tuned grid self-oscillator circuit. The plate and filament supply for this transmitter is not rectified. It is an attachment to the main transmitter, employing the same power supply.

150-watt intermediate frequency transmitter.—This transmitter is an attachment to the main transmitter and has the same frequency range. It is used for short-distance fleet work.

NOTE.—Only one of the three above-mentioned transmitters may be used at a time.

300-watt transmitter.—This equipment operates on frequencies between 1,500 and 2,500 kilocycles, employing a master oscillator power-amplifier circuit. It is probably used for intrasquadron communication.

Quenched-spark transmitter.—This transmitter operates on frequencies from 350 to 1,000 kilocycles and is intended for commercial and stand-by work.

150-watt transmitter.—This is a small homemade transmitter, located outside the main transmitter cage and employing a single 150-watt tube in a self-oscillator circuit. The frequency range is 1,500 to 2,500 kilocycles. It is used for tactical communication. The main power panel is located outside the transmitter cage. This panel also carries two magnetic keying relays which are designed to suppress key clicks. These relays break the primary of the plate transformer of the main transmitter.

The main-office receiving room is a soundproof shielded compartment divided into five individual receiving stalls. The receivers are mounted on the bulkheads in front of the operators. Each operating position has two keys mounted on the edge of the table, one for controlling the transmitter, the other for intrastation buzzer communication. The ventilation and lighting of the receiver room are excellent. Individually adjustable ventilation ducts are supplied at each operator position. Emergency lighting is provided. This room contains eight receivers, as follows:

High-frequency receiver.—This receiver employs one stage of tuned screen-grid radio-frequency amplification followed by a detector and three stages of audio amplification, and covers a frequency range of 5,000 to 20,000 kilocycles by means of plug-in coils. A separate heterodyne is employed.

Two intermediate frequency receivers.—These are superheterodynes covering the frequency range 15 to 1,000 kilocycles. Eleven tubes are employed in a circuit consisting of three stages of tuned screen-grid radio-frequency amplification, first detector, heterodyne, three stages of intermediate frequency amplification, second detector, and two audio stages.

One receiver.—Same as above, but covering the frequency range 50 to 1,000 kilocycles.

Three receivers.—These are 8-tube receivers covering frequency ranges of 300 to 2,000, 600 to 2,000, and 1,500 to 2,000 kilocycles. The circuit consists of three stages of tuned screen-grid radio-frequency amplification, detector, separate heterodyne, and three audio stages.

One receiver.—This is an 8-tube superheterodyne similar to those already described, but covering the frequency range 300 to 2,000 kilocycles.

NOTE.—Each low and intermediate frequency receiver was supplied with a trap for increasing selectivity and eliminating interference.

The secondary W/T office

This station is located on the fifth deck, approximately beneath the after mast. The following transmitters are installed:

Intermediate frequency transmitter.—This is a 5-kilowatt transmitter covering the frequency range 100 to 600 kilocycles. It is understood to be the British destroyer type.

150-watt transmitter.—This transmitter appears to be an attachment to the above. There is some doubt concerning the frequency range, there being two reports—one, 107 to 500 kilocycles; the other, 350 to 1,500 kilocycles. This is a fleet transmitter.

One 5-kilowatt high-frequency transmitter.—This transmitter covers the frequency range 5,000 to 20,000 kilocycles and appears to be a duplicate of that installed in the main office. This transmitter is probably used for shore and strategical communication.

Five receivers are installed, as follows:

Three superheterodynes.—One of these is a 10-tube, another an 8-tube, receiver covering the frequency range 1,000 to 2,500 kilocycles. The third covers a frequency range 15 to 100 kilocycles. This is an 11-tube receiver.

One intermediate frequency receiver.—This is a tuned radio-frequency receiver similar to that installed in the main office and covers the frequency range 350 to 1,000 kilocycles.

Autodyne receiver.—This receiver covers all bands for searching purposes, with an autodyne detector and three audio stages.

The auxiliary W/T office

This station is located on the fifth deck and is forward of the main station, being located almost directly below the citadel.

This station contains the Bellini-Tosi direction-finder equipment, consisting of a goniometer, gyrorepeater, and an 8-tube receiver; frequency range, 50 to 1,000 kilocycles.

In addition, there are two 150-watt radiotelephone transmitters, 350 to 1,000 kilocycles, with accompanying receivers. It is understood that little use has been made of the radiotelephone and that these transmitters would be replaced by 150-watt CW outfits.

It is also reported that there is an 11-tube superheterodyne receiver in this station.

Remote control stations

On the upper deck in the citadel (the admiral's bridge) there is a dispatch office and remote-control station with positions for six operators.

On the third deck in the citadel, corresponding to our "navigating bridge," there is a small remote-control station with three operators' positions.

No provision is made for starting and stopping transmitters, buzzer communication being provided for this service.

Antennæ

The following antennæ are installed at present:

Main antenna.—This is six wires of 7-strand No. 18 phosphor bronze carried on very wide spreaders. There are three wires on each side which lead from the after side of the upper flat of the citadel to the upper radio yard on the mainmast, thence down in two rattails to two antennæ trunks, about 30 inches in diameter. The height of the upper radio yard is estimated at 180 feet.

There are three vertical transmitting antennæ from the quarterdeck to the upper yard on the after (main) mast.

There are three vertical receiving antennæ forward of the mainmast; one of these, however, is understood to be for the admiral's broadcast receiver. There are four vertical receiving antennæ forward of the citadel, probably for the auxiliary station. Antennæ connections are provided to permit leading into the radio-control room in the citadel.

The Bellini-Tosi crossed-loop system is located between the stack and the citadel.

No special provisions are made for clearing antiaircraft-gun fire.

MISCELLANEOUS RADIO NOTES

Duplex operation.—It is understood that all receivers are cut out by the break-in system whenever the 15-kilowatt intermediate frequency transmitter is used. However, no particular difficulty is experienced in duplex operation when using low power. This condition is met by the employment of the 150-watt transmitters described above.

Direction finders.—There is aboard one portable direction finder set with rotating loop and batteries. The frequency range is reported to be 300 to 750 kilocycles.

Field set.—There are no field sets on board. However, it is understood that an ex-Army set was expected soon—frequency range 400 to 1,000 kilocycles, 150 watts.

Five-kilowatt silica tube.—Apparently this tube, which is mentioned above, is the standard transmitter tube in the British Navy. It is about 24 inches long and about 4 inches in diameter. A fiber cylinder is slipped over the tube for the purpose of confining the air jet (cooling) to the walls of the tube. The tube has no base. When the filament burns out the tube is repaired at the Royal Navy Signal Laboratory in England.

Transmitters.—The transmitters are very ruggedly constructed and built for accessibility. However, they are not flexible, and shifting of frequencies in most cases must be done by changing inductance taps. There is no crystal control equipment nor crystal frequency indicators. Adjustment is accomplished with a wave meter. There are about eight small wave meters available in the various radio rooms. Transmitter power supply appears in most cases to be rectified alternating current suitably filtered. All circuits are tuned plate tuned grid. Apparently these transmitters are about 1920 design. It is understood that new transmitting equipment is expected within a year or two.

Receivers.—The standard receiver consists of four units separately mounted.

First: The selector unit which has "listening" and working positions. For listening, the antenna is tuned but directly connected to the grid filament of the first radio amplifier. For working, the tuned antenna circuit is inductively coupled to a tuned input circuit of the first radio-frequency stage.

Second: The radio-frequency amplifier and detector unit box has four tubes mounted in the British Navy standard manner, i. e., inverted sockets lined up in a row extending out in front of the ebonite panel which forms the faceplate for each box. A leather flap on a hinged block hangs down in front of the tubes, affording protection perhaps as well as serving to shield the eyes of the telegrapher.

Three element valves (Admiralty specifications) are standard and two different types of detector tubes were noted although not examined. Commercial tubes are being tested and in the near future may be adopted as standard.

Third: The heterodyne unit. Heterodyne reception is standard, autodyne circuits having been discarded a year or two ago. The standard tube is used as an oscillator.

Fourth: The 3-step audio amplifier, called the "tone mag" (tone magnification), uses standard tubes, and one or more stages may be used. The tubes are mounted in front of the ebonite panel as on the RF amplifier.

The receivers are ruggedly, carefully made, and from all reports must be superior to our standard receivers. Any number of receivers can be used on a single antenna, and that is the normal practice, except that a separate antenna is used with the high-frequency receiver. New standard receivers are expected within the next two years.

Autodyne detectors.—Autodyne detectors are not used. This type of detector was replaced by the separate heterodyne in order to reduce interference encountered when ships operate together.

Battery lockers.—Battery lockers are provided in the various rooms, are very roomy, and ventilated by special supply and exhaust blowers.

Motor generators.—Motor generators are in duplicate, one set being located outside and to port of its radio room, the duplicate being to starboard.

In general, the radio installation appears to be the result of an attempt to provide maximum service for their own needs and at the same time deny information to others through intercepted messages. To attain this, transmitting power has been kept at a minimum while receiver sensitivity has been increased to a maximum. This principle appears particularly sound for naval purposes.

Exact frequency control by the use of quartz crystals or similar methods has apparently been purposely avoided, possibly with the idea that a slight change in frequency can easily be effected in case of interference.

The keying arrangements indicate that a large volume of traffic could not be handled expeditiously. The high transmitting speeds common in the United States Navy could not be attained with the *Nelson's* equipment. No information was available concerning whether or not messages were copied on typewriters or the methods of internal distribution. It appears from the varied locations of the radio offices that distribution methods are probably not as efficient as our own.

The transmitters are obviously of old design, and therefore possibly do not present a true picture of radio transmitting equipment in the British Navy. Our transmitters are far superior. On the other hand, their receiving equipment is superior to ours.

The report shows that the location of the signal bridge on the mainmast has not proved satisfactory, as the signal force has not clear vision forward.

CONSTRUCTION AND REPAIR NOTES

I. *Protection*

(*A*) *Side armor and torpedo protection.*—The evidence is conclusive that the main side belt is built from the side of the ship a distance reported from 4 to 10 feet. The top of this armor belt is at the protective deck, which is the third deck (United States system of nomenclature). The lower limit of this belt was not reported. Its fore-and-aft extent is probably from just forward of the forward 16-inch turret to just aft of the after 6-inch turret.

The space between this armor belt and the ship's side is divided longitudinally by one bulkhead, reported to be 6 feet inboard from the shell. The transverse subdivision of this space was not definitely reported. One officer suggested that the presence of manholes in the outer shell at a distance of 4 to 5 feet above the water line and in alternate frame spaces might furnish a clue to transverse subdivision. However, information from another source is that the lightly covered holes are provided to allow for release of internal pressure caused by explosion. The spacing is so close that there could not be a bulkhead for each manhole; so these manholes alone give no information on transverse subdivision. Part of these wing compartments are used for oil, part for water, and part are void.

The thickness of this side armor belt is variously reported from 12 to 16 inches, with one or two reports above and below this range. Sir William Berry, in an article in the 1929 Transactions of the Institution of Naval Architects, entitled " H. M. Battleships *Nelson* and *Rodney*," states in one place, "Armor, main belt, 14 inches "; in another, " The citadel is protected by a thick armor belt extending from the foremost 16-inch turret to the after 6-inch turret." He also states: " Under protection of the most efficient type, developed from a long series of experiments, has been embodied in the hull structure."

There are one or two reports that the side-armor belt slopes inward from the top and this is in conformity with the *Hood's* side-armor installation, which has a slope of about 10° outboard at the top. This slope of armor has been reported in the torpedo room to be about 5°, and " not very heavy." It is entirely probable that this torpedo-room armor is separate from the side belt and does not necessarily indicate a slope of the side belt.

(*B*) *Protective deck.*—Reports generally agree that there is but one protective deck, this being the third deck. The fore-and-aft extent of this deck is not reported, except that it was seen as far forward as the forward 16-inch magazines and as far aft as the after 6-inch magazines. Speaking of the area protected by the main armor belt, Sir William Berry says, " Over the same area extends an armored deck for protection from plunging shell and aircraft bombs." A sketch accompanying Sir William Berry's article shows it ter-

minating at the forward end of 16-inch magazines, but going aft over the steering gear. Sir Eustace d'Enycourt in discussing Sir William Berry's article says "the deck extends over the greater part of the vessel."

Only one report of transverse extent is made, viz., "The armored deck forms the top boundary of torpedo-defense tanks and the roof of the armored casemate which incloses the vitals of the ship. Between armor belts it is laid in two courses, a 4½-inch course covered by a 2½-inch course. Outboard of the armor belts and over the tanks it was a single course of 4½ inches." This report was based on hearsay, but this general distribution seems probable in view of the weight-saving involved in reducing the thickness outboard of the side-armor belt.

The thickness reported varies from 5 to 8 inches, with one or two reports outside these limits. One report states that it is 10 to 14 inches thick over steam-pipe passages. Sir William Berry states, "Armour, deck, 6¼-inch."

Reports as to the courses of this deck vary from one course to three courses.

(*C*) *Turret armor* (*16-inch turrets*).—The majority of reports on 16-inch turret armor thickness varied as follows:

		Thickness.
Faceplates	Inches	14–18
Roof	do	6– 7
Sides and rear	do	14–15
Barbettes	do	14–16
Armored boxes protecting ends of range finders	do	2¼– 4

Sir William Berry states, "Armour, barbettes, 15-inch; turrets, 16-inch maximum." The gun ports are closed and made spray tight, and possibly gas tight, as follows: Cylindrical metal shields are fitted inside the face plate to move with the gun as it is elevated and depressed, very similar to the arrangement in our new 8-inch cruiser mounts. The surfaces of these shields are polished and oiled, and brass strips are fitted around the jacket of the gun and around the edge of the port, apparently for the purpose of attaching canvas bloomers.

(*D*) *Turret armor* (*6-inch turrets*).—The reports generally agree that the 6-inch turret armor is intended only to be blastproof and splinterproof. Estimates of its thickness vary from 1 to 1½ inches. The gun ports of the 6-inch turrets are sealed in the same manner as those of the 16-inch turrets.

(*E*) *Miscellaneous armor.*—The armor on the conning tower and the rotating hood over the conning tower is estimated to be from 12 to 14 inches thick. No report was made of the thickness of conning-tower tube.

It is generally agreed that the bridge structure, searchlight-control stations and fire-control stations are given blast and splinter protection. One report states " The ship's skin is very light, 1 to 2 inches "; two reports give somewhat greater thickness.

II. *Hull construction, general*

There are several reports that the *Nelson* is of very light construction. One of these states " The ship's skin is very light, having been dished in, over about four frames, by a small fender while passing through canal."

One report states the ship is built on the longitudinal system, and that " channels " are only 8 inches. This is taken to refer to the arrangement of deck beams, and size of deck beams, and not to indicate, necessarily, a complete longitudinal system of framing. Another report notes that " from the third deck up the construction consists mainly of fore-and-aft beams with one athwartship beam about every 25 feet. All considered, the construction is very light above the water line." Still another report states that " the ship is extremely flexible—too much so to keep the directors accurately checked."

Sir William Berry states: "A system of longitudinal girders with widely spaced deep beams in conjunction with web frames was adopted for the principal decks in order to utilize the maximum amount of material for longitudinal stresses, and so reduce the thickness of deck plating required for strength purposes."

III. *Arrangement of bridges, fire-control stations, etc.*

Just abaft the after 16-inch turret there is a conning tower just high enough to look over the highest turret. The steering and engine control are reported to be entirely handled from the conning tower, with voice-tube communication to the bridge. The conning tower has conventional eye slits, about 15 inches long, 2 inches high inside and increasing toward the outside.

Mounted on top of the conning tower is a rotating armored hood, shaped somewhat like a truncated cone, which is a main-battery control station.

Abaft the conning tower is the large bridge structure, frequently spoken of as "Queen Anne's tower." This consists of six levels of inclosed platforms, within which there is a cylindrical tower, with splinter protection, for a flag plotting room, radio room, etc. On the upper inclosed level is the admiral's bridge fitted with a gyrorepeater, voice tubes, phones, and steamer chairs. In the central portion of this deck is the flag plotting room, noted by one report to be fitted like the smoking room in a club. Across the

after part of this level is a radio-control station and communication office.

The second level from the top is the navigating bridge, with voice-tube communication to the steersman in the conning tower. The admiral's and captain's emergency cabins and searchlight-control stations are also on this level. There are five gyrorepeaters and one magnetic compass on the bridge level. View aft from the forward part of the bridge is decidedly restricted, but the bridge is built completely around the central tower structure, so that including the wings, 360° vision is possible.

Next below the navigation bridge is the signal bridge, with two or four signal searchlights on each side, but no provision for flag signals.

The distribution of space on the remaining levels of the bridge structure is not described except that it contains chart house (possibly in central portion of signal bridge), plotting rooms, sea cabins, and the like.

On top of the bridge structure over the after portion is a short mast about 20 feet high, carrying a fire-control top which serves as a spotting station and also contains an antiaircraft control station. Forward of this mast, on top of the bridge structure, is a main-battery fire-control tower (in addition to the armored one over the conning tower), and on each side of this at a slightly lower level is a 6-inch fire-control tower. Abaft the mainmast and mounted on the superstructure or boat deck is a main-battery control station exactly like the one on top of the bridge structure. A little forward of this are two 6-inch control stations, port and starboard. No antiaircraft station aft was observed. A small 2-arm semaphore stand was noted on one of the fire-control stations abaft the mainmast and one on each of the after 6-inch mounts. The range-finder mounts located one on either side of the stack are apparently for the use of the 6-inch battery or possibly for torpedo control.

Sir William Berry states " This structure (referring to the bridge structure) carries the directors for 16-inch, 6-inch, and antiaircraft guns, a bridge for the admiral and staff and for torpedo control, a captain's bridge with signaling position and navigation platforms, and below these various sea cabins and offices."

The flag-signal station is located around the base of mainmast one deck level above main deck, with good vision in all directions except dead ahead. Flags are stowed in pigeonholes in three large movable boxes. There are also signal searchlights at this station. This location for the main visual station is apparently not entirely satisfactory, due partly to its distance from the bridge structure and partly to the fact that the large bridge structure obscures some of

the signals hoisted on the mainmast. So it has been suggested that this signal station would probably be moved forward despite the short hoist available for flag signals forward.

IV. *Notes on topside arrangement*

Sir William Berry states:

The superstructure encircling the base of the bridge structure, the funnel and the mainmast accommodates the antiaircraft and machine guns, while the central space is occupied by the funnel, the boiler-room air intakes, and the blacksmith's, enginesmith's and coppersmith's workshops. Four 36-inch searchlights are carried, one on either side of the funnel and two on a platform on the mainmast. The boats are stowed amidships between the mainmast and funnel and are handled by derrick operated by electrohydraulic variable speed gear winches.

The following notes were found in reports received:

The hawsepipes on deck are covered with a light steel grating to close them and prevent personnel from falling into them.

Large lockers of very heavy plating are installed on the weather deck forward of the muzzles of turret A (forward turret) guns. These lockers contain mine-sweeping equipment except paravanes, which are identical with the type now furnished to the *Texas*. These paravanes are stowed on deck abaft turret A. The large lockers appear to comprise part of a breakwater about 4 or 5 feet high, which runs athwartship abaft the chain pipes. A second breakwater about 2 feet high is just forward of turret A.

The margin planks of the deck are about 3 inches thicker than the rest of the deck and the sheer strake is beveled over them to form a very smart-appearing deck edge. The inboard side of these margin planks forms the waterway, with drains about 9 inches in diameter spaced about 50 feet apart. There are very few scuppers along the ship, which fact improves its appearance considerably. It is quite probable that most of the water from the deck is drained into the tanks between armor belt and outer shell, and pumped overboard from there.

The boats are handled by one center line steel boom stepped on the mainmast and operated by electric power. Pulling boats are handled by davits with boat falls on reels. There are no boat cranes.

Awnings are spread to tripods, about 30 feet apart, along the sides.

No aircraft, catapults, nor fittings for same are installed, and reports vary widely as to whether such installation is contemplated or desired.

The mainmast has a short tripod and cross-trees, with a very light topmast and top-gallant mast. Below the cross-trees a white band is painted to facilitate station-keeping for the ship astern.

V. *Living spaces, accommodations, etc.*

Living spaces on the mess decks seemed amply large and well arranged, though it has been reported that they are rather gloomy. Other reports state the ventilation, especially on third deck, is rather poor, and that crew spaces are very warm. It is reported that all ratings swing in hammocks. Lockers and sea bags are used by enlisted men, the former providing for at least that part of the kit in current use.

The crew and petty-officer spaces and sick bay are subdivided by light sheet-metal partitions about 4 feet high supporting pipe rail about 3 feet high, from which hang green curtains.

Berths in sick bay are of the full swinging type.

Mess tables are long swinging ones hanging by chains.

The galley has oil-burning ranges and steam copper kettles. The galley arrangement is for a general mess, similar to ours. The galleys are dark and hot, though spacious. The ovens in the bakeshop are electric and the bread is said to revolve in balanced trays in these. Warming ovens are installed on the mess decks. There are several officers' galleys.

One report states the ship has no laundry on board.

Crews' spaces are heated by steam coils in the ventilation systems; officers' quarters by electric heaters.

There is no running fresh water in officers' staterooms. Tubs and not showers are provided.

The navigator and signal officer live in the "Queen Anne's tower," and the captain, chief of staff, and admiral have sea cabins there as well. Brass beds are provided for commanders and above. Other officers' furniture is of wood.

Sir William Berry states:

> The galleys are situated on the upper deck (corresponding to our main deck) in the main superstructure. * * * In conjunction with the galleys and bakery and close by are the main kitchen, vegetable kitchen, potato and other stores, bread-cooling room, etc.

VI. *Turrets*

(Turret training and elevating machinery, sprinkling systems, gas-ejecting systems, and miscellaneous notes)

(*A*) *16-inch turrets.*—Entrance into the 16-inch turrets is through a small manhole in the rear of the roof. The gun chambers are not subdivided at all, the only flameproof compartment being the officers' booth. The 16-inch guns are in separate slides, not cross connected, and the turrets are exceedingly wide. Between the center and wing guns there are enormous supporting columns built up of heavy structural steel. It has been remarked that space and weight are used very extravagantly compared to the possibilities attending the single-slide, drop-plug installation of the *Oklahoma*, *Pennsylvania* type 3-gun turret.

The turret-training gear is located on the deck below the gun chamber, which has been stated to be relatively inaccessible.

All machinery in the turrets is hydraulic and one report says that the hydraulic power supply is from an electric motor somewhere outside turret. It is further noted that it comes into the turret

through a pipe about 6 inches in diameter to an accumulator, which is a very heavily constructed double cylinder about 15 feet over all, occupies a whole deck of the turret.

Sir William Berry states:

Three hydraulic pumping units driven by compound steam engines are fitted, each in a separate water-tight compartment under protection, for supplying power to the 16-inch mountings. Each unit has an output of 150 cubic feet per minute at a pressure of 1,250 pounds per square inch.

As to auxiliary machinery, one report states: "No auxiliary machinery was noted except a whip hoist in the rear and outboard of each gun, which may have been an auxiliary shell hoist. It appears that there must be main and auxiliary pumps for each turret." Another report says, "There is a hand hydraulic gear in the turrets as a stand-by for the electric."

No mention is made of sprinkling systems except one report, which states, "Sprinkling and flooding valves are stated to be of the quick-opening gate valve type, not operated pneumatically."

Gas ejector air pressure was reported from 1,000 to 1,300 pounds per square inch.

The rear plate of each turret had hung on it several thin, removable plates about 2 by 3 feet, which were said to cover vent holes in the rear plates. Two reports say the purpose of these covered holes to be to relieve pressure in case of a flareback or powder explosion. Other reports state that turrets were not kept under internal pressure and that these plates were removed during firing. Still other reports note the turrets to be "probably gas-tight," but one says that the voice tubes were not fitted with diaphragms.

Reports as to the reliability of turret machinery are diametrically opposed. One states that the gear in the turret seems to be very sturdy and well designed for its purpose, as there are stated to be few casualties during firing. Another states "There are many breakdowns in these turrets" and gives an example in which all three guns of the X turret on the *Rodney* jammed on the overhang of the B turret "causing considerable trouble." The view that the complication of the turret machinery is causing considerable difficulty seems to be borne out by the fact that an engineer lieutenant is assigned as ordnance material officer.

[NOTE.—Turrets are lettered as follows: A, forward; B, middle; X, aft.]

(*B*) *6-inch twin turrets.*—Entrance to these turrets is through large doors in the rear. The guns are said to be in single slides, not cross connected. The 6-inch turrets have covered vents in the rear plate similar to those described for the 16-inch turrets; but these turrets are reported by several observers to be "probably gas-tight."

All power for these mounts is furnished through hydraulic variable speed gears.

VII. *Ammunition stowage and handling*

(*A*) *16-inch ammunition.*—The allowance of 16-inch shell is 1,200 for the ship. Each shell is reported to weigh "nearly a ton." The shells are stowed horizontally in bins in shell rooms forward and abaft of the shell-handling rooms. The shells are removed from the bins by tongs and trolleys and are landed horizontally on loading devices at the corners of the shell rooms adjacent to the handling rooms. From these devices the shells are rammed through flame-proof scuttles in the bulkhead by hydraulic power. In each corner of the shell-handling room is a shell receiver which takes the shell in a horizontal position from the shell room and transfers it across an extended spanning tray to one of the traveling "buggies." Movement of shell and spanning tray is controlled hydraulically by a single operator at each receiver. A ring concentric with the turret structure but independent of the rotating structure, rotates in the handling room and carries four "buggies" or shell-transfer devices. A single operator rides with each buggy and controls it hydraulically. A projectile being received horizontally in the buggy cradle is apparently transferred vertically to the shell hoists in the rotating structure.

This method of handling shells is said to be complicated and cumbersome and one case is mentioned where a "hang up" in a shell-handling room resulted in sending the *Nelson* to the navy yard for two weeks to clear the jam.

The shell hoists are of the reciprocating pawl type, similar to those on the *California*, and there is one for each gun. One report says that no auxiliary power or hand shell-hoisting equipment is provided. (See paragraph on auxiliary machinery above.)

Striking-down hatches are installed outside the turret barbettes for sending ammunition below, and the trunks are fitted with guides for sliding projectiles down without their bumping from side to side. It was stated that a man was killed because the boom rigged over the hatch carried away, and boom, tackle, and 16-inch projectile all fell on the man.

The 16-inch powder magazines and handling room are one deck below the shell-handling room. The magazines are cork lined and are said to have wooden flooring, with special shoes provided to wear in the magazines. CO_2 cooling plants are installed for reducing the temperature of the cordite, the aim being to keep the temperature down to 70° F. However, in the Tropics, with all cooling systems in operation, it is said to be impossible to keep magazine temperatures below 80° F.

Access doors from magazines to powder-handling rooms are 24 by 24 inches and located at the base of bulkheads. Powder-passing

scuttles pierce the bulkheads at the base. They are operated by a screw thread. A double-door flame-proof system is employed which is made positive by an interlocking gear. The scuttles are equipped with rollers to assist in passing powder.

The powder is stored in the magazines in leather containers, but these are removed before the powder is sent up the hoists. The bags are carried by hand from the scuttles to the hoists, which pass up through the shell-handling rooms in the rotating structure of the turret, and which are completely inclosed flame-proof trunks. It is said that this hand passing of powder from scuttle to hoist is the only hand operation involved in the powder supply. No upper powder-handling room was observed.

There is one powder hoist for each gun. Several reports say the powder hoists are of the car type.

The powder-handling room deck is said to be over an oil sump which contains oil for the hydraulic system, which oil is said to be inflammable.

(*B*) *6-inch ammunition.*—Six-inch projectiles are delivered to each gun through a reciprocating pawl hoist forward and to the left of the gun. There is a loading tray in line with the shell roller trough which receives the shell from the hoist. The shell is supplied by gravity from trough to hoist.

Powder is supplied through three scuttles with flame-proof doors at the level of the working platform, operated by foot treadles. The hoists are apparently tubes inclined slightly from the vertical and powder comes out end up.

Several reports state that powder is stored in cans and sent up in cans. These cans are then returned below through a tube, or if rapidity of fire does not permit this, they are ejected through the door in the rear of the turret. However, it has been reported that leather containers are used for 6-inch powder as well as for 16-inch powder.

Sir William Berry states that the 6-inch magazines have an independent cooling plant.

(*C*) *4.7-inch antiaircraft ammunition.*—The 4.7-inch antiaircraft ammunition is fixed and total weight per round is about 56 pounds (?). There are three ready boxes for each antiaircraft gun, each holding about 15 rounds. There are also some ready boxes on the next deck below, cartridges being passed up to the boat deck through hatches. One report says there is a separate ammunition hoist for each gun. If so, these probably discharge on the deck below the boat deck and ammunition is passed up from there by hand.

VIII. *Stability, seaworthiness, maneuverability, etc.*

Reports vary widely on these subjects. One report says that the ship handles well, and has a small turning circle at full speed. Another report says the ship behaves splendidly at sea but in maneuvering is confusing, due to the pivoting point being well forward of the bridge. The location of the pivoting point is well established, from several reports, at a point just abaft the second 16-inch turret.

The maximum roll reported was 15° in a storm while crossing the Atlantic. In this storm one wave broke over the quarter-deck, smashing a lifeboat at the davits.

Phrases used to describe the behavior at sea are quoted below:

"Very stable."

"Most steady—small loose articles on tables had not rolled about at all during storm."

"Period very slow."

"Rolls an unusual amount with a sort of corkscrew motion."

"Roll quite accentuated; deep but slow."

"Rolls excessively in ordinary weather."

"Great roller—quick period."

"Ship has a reputation of pitching very badly."

Perhaps the most authoritative statement was in reference to the high breakwater in the forecastle, that they had taken no seas over the forecastle; that they had encountered a blow off the Azores in which they rolled 12°, but that only one wave had slapped over the quarter-deck.

IX. *Damage control*

As stated under Part I above, the space between side armor and outer shell is subdivided into small tanks and void spaces. These small compartments are piped up for rapid pumping and flooding. In way of the firerooms and engine rooms a pipe passage was seen, extending fore and aft inboard of the "blisters," in which were two pipes about 8 inches in diameter with leads to the "blisters." The flooding and pumping of these "blisters" (more correctly "wing compartments") are controlled from central stations throughout the ship—about 10 compartments to a station. A number of submersible pumps were seen.

One report states that definite information was received that all bottoms, void spaces, etc., are provided with pneumercators which register the actual amount of water entering the compartment.

In normal operation the trim of the ship is maintained by flooding or pumping salt water into or from certain compartments, and not by moving fuel oil.

Sir William Berry's statement on this subject is quoted below.

Pumping and flooding arrangements.—These are extensive and are designed to deal rapidly with possible damage, and the correction of heel and trim consequent thereon. For compartments other than those occupied by the main machinery, 11 electrically driven centrifugal pumps, each with an output of 350 tons per hour, are provided. The pumps are of the submersible type and are self-priming.

The main and auxiliary circulating water pumps are arranged to be available for pumping out their respective compartments and the wings in the vicinity, and, in addition to a high-capacity steam-driven turbo pump, is fitted in the after boiler room.

For the salt-water service and for dealing with normal drainage and bilge water, nine 50-ton electrically driven pumps are fitted in those portions of the ship outside the machinery spaces, whilst the fire and bilge steam pumps carry out similar functions inside these spaces.

One use which is said to be contemplated for the flooding system is to flood sufficient void spaces during action to sink the ship 6 feet in the water and accept the reduced speed for the increase in protection of vitals and the reduction in target area.

In connection with damage control, it should be pointed out that the second deck is "entirely open," i. e., there are very few water-tight bulkheads between the main and second decks. The third deck is described as "partially open," with numerous compartments extending more than 100 feet fore and aft. One report stated that the compartmentation on the third deck does not approach that of the *California*.

Approximate calculations indicate that when the *Nelson* is operating in normal condition her "floodable length" amidships is equal to three compartments, and at the forward and after quarter points only two compartments. That is to say, damage at a bulkhead between two boiler rooms, for example, would sink the ship till her water line would be tangent to the third deck. Now, if the third deck be damaged at the same time, the *Nelson* would very probably sink, unless her third deck were carefully subdivided (which is not indicated in the reports). This is based on sinkage only, with no heel, i. e., it is assumed counterflooding would be used immediately following the damage. An angle of heel, of course, would sink the ship sooner under these conditions.

Now, if the ship were operating with a draft of 6 feet more than normal, as is suggested in the reports, she becomes a "1-compartment ship"; that is, the flooding of one compartment at the forward or after quarter point, with simultaneous damage to the third deck, would probably sink the ship.

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No attempt has been made to estimate stability under damaged conditions, as there are not sufficient data on the initial stability of the ship.

Under the condition where the normal draft is increased 6 feet by flooding wing compartments, estimates based on Taylor's Standard Series indicate that speed would be reduced about 1 to 1½ knots from 23 knots.

X. *Materials*

Woodwork.—The great majority of the reports agree that the deck planking is of fir or pine. One report stated the decks are badly scarred, with some evidence of "wearing out" in spots, and that they would not be considered satisfactory in our service.

Wood decks (fir) are reported on the exposed portions of the bridges and linoleum on the inclosed portions. Some reports mention linoleum on portions of the boat deck. The deck covering in crew's spaces is of linoleum, reported to be lighter and cheaper than ours. Seams in linoleum are covered with galvanized-steel rounded molding.

Mess tables and benches are of ash. Bulkheads between staterooms were stated to be of 5-ply wood. Wood is also used extensively for furniture and doors in officers' country. All reports on the question of fireproof wood had no information that any fireproofing process had been used.

On the subject of wood Sir William Berry says: "The weather decks were sheathed with Douglas fir in lieu of the customary teak, the loss in wearing qualities and appearance being sacrificed for weight. Plywood was largely used for dwarf and divisional bulkheads not of importance for strength purposes. The heavier standard articles of furniture were redesigned and very considerably lightened, and here again plywood was extensively used. All wood fittings were fireproofed by the 'oxylene' process."

Aluminum.—Various uses of aluminum or aluminum alloys were reported as follows:

1. Bulkheads (presumably nonstructural).
2. All lockers (kept bright).
3. All voice-tube outlets (kept bright).
4. Some ventilation ducts and some voice tubes, others being steel and brass, respectively. Aluminum was probably on test and was painted the same as the surrounding structure.
5. Ladders.
6. Lighting fixtures.
7. Large connection boxes—cast aluminum.
8. Mess gear.

No aluminum fittings were noted on the weather decks, and the only protection against corrosion of aluminum fittings, where noted, was red lead and paint.

In regard to aluminum Sir William Berry says: " Extensive use was made of aluminum and its alloys in the manufacture of such articles as kit lockers, storeroom cupboards, mess racks, etc. For outboard fittings * * * the results have so far been disappointing."

There was one report that no brass or bronze is used in wake of the magnetic compasses, a nonmagnetic steel similar to " Enduro " being used instead.

Sir William Berry says: " One of the most fruitful sources of weight economy was found in the employment of 'D' quality steel in place of 'H. T.' * * * This 'D' steel has an ultimate strength of from 37 to 43 tons per square inch, with a minimum elastic limit of 17 tons per square inch; about 6,500 tons of this steel was used in the hull structure of each ship."

Paint.—The *Nelson* is painted inside and outside with a high-gloss enamel. The outside painting seems to have been a very special job—perhaps done on account of the *Nelson's* visit to Panama. The surface was rubbed down with sandpaper and two coats of flat and two coats of enamel applied. It is said to have been a two months' job for all hands, at a cost of £200, but it is expected to last a year. The outside paint is described as a " very dark war color."

The inside paint is described in several reports as being rather dark. One report says the wardroom and crew's spaces have a decided bluish tinge to the bulkheads. It was explained that white paint without any blue turned yellow very rapidly and that the addition of blue provided more lasting color. The wardroom is coated with cork paint.

There was one report to the effect that the mainmast is painted with " Silverine " for invisibility on the horizon at sea.

XI. General notes

A. Anchors and anchor gear.—There are three patent anchors, each weighing about 8½ tons. The chain cable is reported to be of forged chain, made up of studded links exactly like ours, except that each weighs about 112 pounds and is very large. The chain is furnished in 12½-fathom shots, with Kentner shackles. The anchor-handling gear is described as hydraulic, similar to our latest battleships. Sir William Berry describes it as follows:

Two bower and one sheet cable holders are fitted. The former, with the middle-line capstan, are driven by an electrohydraulic variable-speed-gear installation, consisting of three separate power units, which can be used independently or cross connected.

B. Steering gear.—The steering gear is reported as being electrohydraulic, with a steam steering engine as an auxiliary. Sir William Berry described it as follows:

A balanced rudder is fitted, operated by a steering gear consisting of four hydraulic cylinders, with single-acting rams, arranged in opposed pairs at each end of the rudder crosshead. The rams are operated by oil under pressure supplied from three variable-speed gear pumps operated by electric motors. Each pump, with its motor, is contained in a separate water-tight compartment, and normally two pumps are in use at one time, the third being held as a stand-by pump. In case of complete failure of the supply of electric power a variable-speed gear pump, driven by a steam engine, is fitted in the after engine room.

C. Miscellaneous gear.—Sir William Berry mentions 10 deck winches for working paravanes, handling torpedoes, ammunition, etc. Six of these have electrohydraulic Hele-Shaw type motors and four have direct electric drive. The boat hoisting winches have electrohydraulic motors and the aftercapstan a Hele-Shaw type electrohydraulic motor.

AVIATION NOTES

RUSSIA

ORDER FOR ITALIAN-BUILT PLANES

It is reported that the order for Italian planes and motors by the Russian Soviet Government, which has been under consideration for some time past, has now been concluded.

It is understood that this order includes the purchase by the Russian Soviet Government of 75 seaplanes of the "*S-62*" type as built by the Societa Indrovolanti Alta Italia (Savoia-Marchetti Aircraft Factory), equipped with Isotta-Fraschini "Asso" direct drive 750-horsepower motors. In addition to the motors with which these planes will be equipped, the order includes 75 spare motors of the same type.

The delivery of above planes and motors is to be made in Italy during 1931–32. Payment is to be made over a period of two years, and 75 per cent of the amount is guaranteed by the Italian Government.

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JAPAN

AMERICAN AIR FORCES

By Shinsaku Hirata

[Translation from Revue Diplomatique dated January 1, 1931]

EDITOR'S NOTE.—*The author, Mr. Hirata, first came into public notice during the session of the London Naval Conference in 1930, at which time he wrote several articles on the London conference. After the conference he published a pamphlet, Our Failure at the London Conference. He has also appeared as a speaker at public meetings, when he called attention to the deficiencies caused to the Japanese Navy by the London naval treaty.*

It is noted that the writer's estimate of the Japanese naval aviation force is a very conservative one; for example, the shore based organization of 17 squadrons, with a total of 136 serviceable planes, is much too low. The basic organization of a squadron is 16 planes—8 in active commission, 4 in full commission in reserve, and 4 in local reserve. In addition to this there are sufficient planes in storage to bring the squadrons to a strength of 24 planes each. The total number of planes in aircraft carriers is much greater than 39 planes.

NEW POSITION GIVEN TO AIR FORCE ACTION IN THE PACIFIC

The ratification of the London navy treaty brought considerable change to the balance of naval forces in the Pacific. From the strategic point of view the possibility of operations by the United States Navy air forces in the western Pacific has increased, and from the tactical point of view the sphere of action of the air forces has been widened.

The reason why operations by the United States Navy in the western Pacific is rendered more easy is that, in comparison to the Japanese Fleet of 1930, the Japanese Fleet of 1935 will be placed under the following disadvantages:

(1) Due to the reduction in submarine tonnage from 78,000 tons to 52,700 tons, there will be fewer opportunities for Japanese submarines to carry out surprise attacks against the enemy's main force. This is a serious blow to the Japanese Fleet, which possesses inferior strength as compared to the enemy fleet.

(2) In 8-inch-gun cruisers Japan at present has a 50 per cent superiority in fighting strength as compared with the same category of ships of the United States. In 1935, however, the ratios of this type of ship will be changed in the ratio of 100 per cent to 66 per cent in favor of the United States. This weak point will considerably affect our action in the first line.

As compared to the above, the United States Navy in 1935 will enjoy the following advantages over the Japanese Navy of the same year:

(1) With the filling of the gap in 8-inch-gun cruisers, 25 per cent of the cruiser tonnage would be equipped with flying on and flying off decks, which will increase the strength of the air force available for service overseas.

(2) Reduction in the submarine tonnage of Japan will reduce the risk of casualties to battleships and increase the action of vessels equipped with aircraft.

On the above points there seems to be little difference of opinion between the Office of Naval Operations and the Japanese Naval General Staff.

Under these circumstances, in connection with operations in the Pacific by both navies, it is natural that more importance should be attached to the air forces, one of which would assume the strategy based on attack and the other that based upon the defense; the United States Navy would be superior to the Japanese Navy in forces afloat, which would be conteracted by the Japanese by having a superior air force.

The hearings before the Committee on Naval Affairs in 1930, which frankly set forth plans for operations against Japan, records the opinion of Admiral Pratt to the effect that, while the United States can find few targets for her submarines in a sea battle, she has many warships exposed to suprise attack by Japanese submarines; therefore it is advantageous for the United States Navy to

decrease the number of enemy submarines as much as possible. The admiral concludes that to the same degree as the necessity decreases for guarding against attacks by enemy submarines the United States Fleet would be able to bring into play its superior fighting strength.

Again, in the same document are found the following words of Rear Admiral Moffett, Chief of the Bureau of Aeronautics, who attended the London conference as an expert.

As a result of the London naval treaty our Navy is permitted to equip 25 per cent of our cruiser tonnage with landing platforms. Landing platforms are far superior to the catapults now in use. By adopting landing platforms a new field will be opened up for the study of air strategy by our Navy.

The reason Admiral Moffett laid so much stress on landing platforms is to be found in the fact that in an operation in the Pacific the main force of the American Air Force would consist of deck planes. There is no doubt as to the usefulness of aircraft in a sea battle. However, air tactics are still in a stage of development and radius of action of aircraft is not much more than 500 miles. This would make an action by aircraft from land bases hopeless in case of an American attack against Japan, except an air raid against Formosa by the American Air Force stationed in the Philippines. From this it follows that the only way the United States Navy can carry out an air raid over Japan proper is to use mobile floating bases for its aircraft. American aircraft carriers and cruisers equipped with deck planes would have to be dispatched to the seas adjacent to Japan.

The air force which the United States would be able to use in an attack against Japan, therefore, would consist in the main of deck planes of vessels and a part of the landplanes, which would be based on either the Philippines or on a certain point in southern China. These conditions will not be changed for at least 10 years to come, and they plainly show that though the air forces would be a decisive factor in an action in the Pacific, they can not claim an existence independent of the forces afloat.

AIR POLICY OF THE UNITED STATES

NOTE.—The writer describes the policy of the United States Navy in constructing and maintaining aircraft, referring to United States naval policy, and concludes that this policy points to the study of those airplanes best fitted to the operation on the Pacific, and that the plan for constructing 1,000 planes in 5 years is the concrete result of this policy. He says Rear Admiral Moffett is responsible for the construction plan, and goes on to show how these 1,000 planes are to be distributed among different categories, and how they are to be allocated among the various stations. He points out that since the age limit of aircraft is reached in a comparatively short length of time, in order to have 1,000 planes by June, 1932, 1,614 planes have to be constructed after 1926; that the number of useful planes by the end of 1930 is 939, which shows the plan nearing its completion. The writer explains the functions of the Army, Navy, and Marine aircraft, quoting Navy Department General Order No. 132.

The duties of Army planes are in most cases defensive. The duties of United States Army planes in a war between the United States and Japan would be confined to guard duty in their home country and at naval bases, except possibly a battle in defense of the Philippines. Although it is possible to anticipate a small number of flying officers rendering assistance by joining the Chinese Army, dispatching a large number of men across the Pacific is unthinkable, for the United States would be able to attain her purpose by paralyzing the Japanese Army in Manchuria and to uproot Japanese influence there without any assistance by her Army. The Japanese Army, sustained by sea-borne communications, would find herself in an untenable position should the Japanese Navy be destroyed. It would only be necessary for the United States, therefore, to defeat the Japanese Navy, and need not waste billions of dollars in a land warfare on the Asiatic Continent. The United States Army planes which would participate in an action against the Japanese Army and Navy would be limited to the flying corps in the Philippines, a few squadrons to be dispatched to assist the Chinese Flying Corps, and those stationed in the Hawaiian Islands.

In case a battle should take place in or around the Philippine Islands, the 54 marine planes of the P.N. type would fly from Hawaii to Guam by way of Wake Island, and from Guam to the Philippines, flying to the northward of Yap Island. Should they join the Army planes stationed in the Philippines, the combined attack against the island by the Japanese Navy and Army would encounter serious difficulties.

AIR TACTICS

NOTE.—The writer here says a textbook, Naval Aviation, used at the Naval Academy, Annapolis, should not be overlooked as a means of understanding the attitude of the United States Navy as concerns the air force and its air tactics. He states that the textbook clearly shows that the United States Navy is neither laying, like General Mitchell, too much emphasis upon the air force, nor underestimating it like the conservatives, but that the air force is considered as one of the important elements which make up the naval strength. He thinks that for control of the sea it is most essential to obtain control of the air.

(In connection with a bombing attack by an airplane, the writer quotes *Winged Defense*, by General Mitchell, and narrates briefly the bombing done by the United States Navy against battleships *Alabama*, *New Jersey*, *Virginia*, and *Ostfriesland*. The writer attributes the success of these bombing operations to the fact that these ships were stationary, and calls the bombing done against the *Washington* and *Tosa*, in 1924 with 1,500-pound bombs, failures. He next emphasizes the effectiveness of chemical warfare staged by aircraft against a fleet.)

A bombing attack at night is most difficult to avoid, for, in spite of the regulation of lights on board vessels, the fire coming up the smokestacks usually reveals their position to an attacking

bomber. This difficulty was experienced by the Second Fleet under Vice Admiral Ilda in maneuvers held in the South Seas in the summer of 1930.

A torpedo attack is another form of attack against an enemy warship. While it is more dangerous than a bombing attack, its effectiveness is even more doubtful than that of bombing.

Judging from the instructions in Naval Aviation, the hearings of Congress, and the Proceedings of the United States Naval Institute, it seems that the following methods of attack would be adopted by the United States Navy planes in case of a battle between the main forces of American and Japanese Fleets:

(1) The air squadrons of the United States Navy Fleet would be equipped with planes of superior quality, maintaining always a superiority of 50 miles in their radius of action, and would assume offensive tactics. The larger radius of action would permit them to take off ahead of the Japanese fighting planes.

(2) During a battle their superior climbing power would enable them to occupy a higher level than the Japanese planes.

(3) They would thus be able to attack enemy planes coming into the field of action late and to obtain control of the air before the opposing fleets should come within fighting distance of 30,000 meters.

(4) Control of the air once obtained, effective spotting could be done.

(5) At the same time the United States Navy torpedo and bombing planes would carry out bombing and torpedo attacks.

WINGED DEFENSE OF JAPAN

Before a decisive battle between the two fleets could take place the United States Navy would send its aircraft carriers and cruisers equipped with deck planes to seas adjacent to Japan proper and from there carry out air raids against Tokyo and other cities where important manufacturing centers are located. Should the American P.N. type bombers, which would be sent to the Philippines via Guam and Hawaii, come over to Japan with the intention of bombing Japanese cities, planes with a capacity of greater than 2,000 miles would be able to cover the distance of 1,360 miles from Guam to Tokyo or the 1,320 miles from Manila to northern Kyushu to carry out an air raid.

Still, so long as the Japanese Fleet is in existence, air raids by American planes could hardly go so far as to completely destroy the manufacturing districts of Japan. Those planes which could fly over to Japan proper from Wake, Midway, or Aleutian Islands would be limited to a small number of large-sized bombers, and those planes dispatched for an air raid from the Philippines and Guam would be limited to a small number of large-sized planes with slow speed, and in either case no fighting planes would convoy them.

It would be too hazardous for the United States Navy to carry out an air raid by deck planes of the aircraft carriers before a decisive battle between the main forces of the fleets. Even one or two deck planes would be too valuable to be sacrificed for a doubtful cause before the decisive engagement. No commander would risk 200 deck planes of the *Saratoga* and *Lexington* under such circumstances, for should a general raid be carried out, for example, against the city of Tokyo, and inflict more damage on the streets than did the earthquake of 1923, the raiding deck planes would suffer heavy losses in a fight with the Japanese planes guarding the city. Therefore both sides would reserve their aircraft carriers until a decisive battle should be fought.

Again, since battleships and cruisers of the first line are all equipped with deck planes, the entire number of planes attached to the United States Fleet at present is 512, to which should be added the planes of the Marine Corps, bringing the total to approximately 600 planes. In sharp contrast to this the present state of the Japanese Aviation Corps is not satisfactory. For example, the number of air squadrons is: Kasumigaura, 7; Yokosuka, 5; Sasebo, 2½; Omura, 2½; total number of serviceable planes for all aviation corps is 136. From this, in time of war, should be deducted the number of planes to be used for guard duty and training of aviators.

Even less satisfactory is the present state of aircraft carriers. In this category Japan possesses—

Akagi, 26,900 tons; ten 8-inch guns; speed, 28.5 knots.
Kaga, 26,900 tons; ten 8-inch guns; speed, 23 knots.
Hosho, 7,470 tons; four 5.5-inch guns; speed, 25 knots.

The total number of deck planes of these aircraft carriers at present is 39. The total number of deck planes of vessels other than aircraft carriers is 32, making a total number of 71 planes at present.

In future warfare, should our naval air force be increased by 3 aircraft carriers equipped with deck planes to their full capacity of 125—i. e., increasing the present strength by 86 planes—vessels other than aircraft carriers be equipped with 20 more deck planes, and 6 squadrons with a total of 48 planes added to our force, the total number of our planes in action would never be over 200.

It should be noted that in comparison to their displacement our aircraft carriers are equipped with comparatively few deck planes. The reason for this seems to be that our Navy authorities, being impressed by the double decks of the British aircraft carrier *Furious*, constructed aircraft carriers with three decks, which has made the space for flying off deck narrow, and caused confusion to the planes taking off, which is not the case with an aircraft carrier of single deck.

In spite of the assertion by Vice Admiral (Constr.) Hiraga to the effect that the Japanese aircraft carriers are excellent vessels, since there are few obstacles on deck, location of guns satisfactory, and stabilizers perfect, we can not but wish that the *Akagi* and *Kaga* had at least a capacity for 100 planes each. We also regret that the catapults of our battleships and cruisers are obviously inferior to those of corresponding American vessels.

Added to this, the performance of American planes are far superior to those of Japan. For example, as compared to our 1930 type planes, the American planes *TS–1*, fighting plane, 200 horsepower engine; *FB–5*, fighting plane, 460-horsepower engine; *VO–1*, reconnaissance plane, 220-horsepower engine; *T3M*, bombing plane, 800-horsepower engine, are all superior.

It is not necessary to say which side would be victorious should the American planes with a speed of 350 kilometers an hour and a climb of 3,000 meters in 4 minutes be opposed to the Japanese planes with a speed of 200 kilometers an hour and a climb of 3,000 meters in 9 minutes.

GENERAL SITUATION IN 1936

The new expansion program of the Japanese Navy Air Force decided upon in November, 1930, provides for the construction by the end of 1938 of 14 additional air squadrons, with a total of 186 planes and 8 deck planes, at a total cost of 102,100,000 yen. The details of this program are as follows:

Fighting squadrons: 3 squadrons, 12 planes, 4 reserve planes.
Bombing planes: 7 squadrons, 12 planes, 4 reserve planes.
Large-size flying boats: 1 squadron, 2 planes.
Medium-size flying boats: 3 squadrons, 8 planes.

When this program is completed in 1938, the present 71 deck planes and 120 landplanes will be increased to 79 and 306, respectively, or a total of 385; i. e., approximately 38 per cent of the strength of the American naval air forces in 1931. It should be noted that by 1936 2½ of the contemplated 14 squadrons will not be completed.

Due to the completion in the near future of the aircraft carrier *Ryujo* (7,600 tons) and the modernization of battleships and cruisers, the total deck-plane capacity would be increased to 250. Besides, in case of emergency, 180 land planes could augment the deck-plane force. Therefore, the total number of planes the Japanese Navy would have in its first-line defense would be approximately 430, which number equals the number of the American forces in 1931. However, it should be remembered that the American force in 1936 is not that of 1930. It is expected that the following new strength will be added to the present plan of 1,000 useful planes:

(1) The new fifteen 10,000-ton cruisers will be equipped with a total of about 100 deck planes.

(2) Construction of between one and three new aircraft carriers of 13,800 tons each is expected, the total number of deck planes of which will be between 80 to 260.

(3) Construction of four 6-inch-gun cruisers will add another 80 deck planes.

(4) Another addition of between 20 to 50 planes is expected because of the expansion of the air force attached to the Asiatic Fleet and to the Aviation Corps in the Philippines.

In this connection Rear Admiral Moffett's recommendation to the Naval General Board should be recalled, in which he (Rear Admiral Moffett) recommended the construction of eight 6-inch cruisers each equipped with 20 deck planes.

Should the above plan be realized the total number of planes which the United States could put into service by the end of 1936 on the western Pacific will be about 850 to 1,000. However, no definite plan has yet been announced. In its stead is the new 1,000 useful plane program proposed by the General Board at a cost of $85,000,000. It is apparent that such a program would be the subject of much controversy. Still, these 1,000 planes are the indispensable advance guard of the United States for carrying out her economic imperialism, and it should be accepted as an accomplished fact that the program will be realized. As in the past, military programs of the United States have always passed through three stages, namely, proposal, objection, and approval.

In case these 1,000 planes appear in an action on the western Pacific, the strategic position of Japan will be at a great disadvantage. It will be demanded of the Japanese Navy to display the highest degree of human efficiency in order to guard the line of national defense in the face of a fatal inferiority both in naval strength and in the air force. The only method left for the Japanese Navy in defending her national safety is to assume great risks and engage in hazardous tactics. In air fights also the Japanese Air Force will have to engage in daring tactics. For example, Japanese planes would be required to make every effort to destroy the enemy aircraft carriers. Our aircraft carriers would also be the mark of attacks by enemy planes; but even should our aircraft carriers be destroyed we have sufficient land bases, such as Hachijojima, Ogasawara-shima, Minamitori-shima, Jaluit (Marshall Islands), and Ponape Island (East Carolines), besides naval air stations in and around Tokyo. In time of war these places would be armed with antiaircraft guns and be made bases for land and sea planes. It follows from this that in case the aircraft carriers of both sides should be destroyed the advantage would be on the side of Japan.

LIMITATION OF ARMAMENT NOTES

THE WASHINGTON AND LONDON TREATY NAVIES

The Washington treaty limited capital ships and aircraft carriers as follows:

	United States	Great Britain	Japan	France	Italy
	Tons	*Tons*	*Tons*	*Tons*	*Tons*
Capital ships	525, 000	525, 000	315, 000	175, 000	175, 000
Aircraft carriers	135, 000	135, 000	81, 000	60, 000	60, 000

The treaty signed at London in April, 1930, by the United States, Great Britain, and Japan limits other types of ships as follows:

	United States	Great Britain	Japan
	Tons	*Tons*	*Tons*
Cruisers, 8-inch-gun type	180, 000	150, 000	108, 400
Cruisers, 6-inch-gun type	143, 500	192, 200	100, 450
Destroyers	150, 000	150, 000	105, 450
Submarines	52, 700	52, 700	52, 700

The London treaty further stipulates that no capital ships are to be laid down during the years 1931–1936, except that France and Italy may build the replacement tonnage which they are entitled by the Washington treaty to lay down in 1927 and 1929.

The following tables, completed as of the date of signing the London treaty in April 1930, show—

(1) The tonnage which each of the countries concerned may lay down and complete in each category by December, 1936.

(2) The additional tonnage which may be building at that time.

(3) The average which must be laid down in each of the intervening years in order to have a treaty navy composed of vessels within the age limit by December, 1936. This table takes into consideration the recognized length of time required to build each type of vessel.

(4) The steps (building programs) which the countries have taken since the treaty was signed to arrive at a treaty navy by December, 1936.

(1) *Table showing tonnage which each of the countries concerned may lay down and complete in each category by December, 1936*

	United States	Great Britain	Japan	France	Italy
Capital ships				70,000	70,000
Aircraft carriers	55,000	90,000	19,600	60,000	60,000
Cruisers "A"				[1]	[1]
Cruisers "B"	73,000	91,000	35,755	[1]	[1]
Destroyers	150,000	110,839	25,695	[1]	[1]
Submarines	25,100	17,651	12,000	[1]	[1]

[1] Not limited by treaty.

NOTE.—The comparatively large tonnage available to Great Britain for new aircraft carriers is due to the fact that 3 of her carriers, aggregating 55,900 tons, which were completed in 1924 and 1925, are considered as experimental, in addition to the Argus, which was completed in 1918.

(2) *Table showing additional tonnage which may be building at that time, assuming that the tonnage listed in the above table has been completed*

	United States	Great Britain	Japan	France	Italy
Cruisers "A"				[1]	[1]
Cruisers "B"	14,100	86,070	16,165	[1]	[1]
Destroyers		2,960	8,095	[1]	[1]
Submarines	14,830	6,395	7,200	[1]	[1]

Not limited by treaty.

(3) *Table showing the average tonnage which must be laid down in each of the intervening years in order to have a treaty navy composed of vessels within the age limit by December, 1936, taking into consideration the recognized length of time required to build each type of vessel—Tonnage already provided for when the treaty was signed is not included in the year 1930*

	United States	Great Britain	Japan	France	Italy
Aircraft carriers:					
1930	13,750	22,500	4,900	15,000	15,000
1931	13,750	22,500	4,900	15,000	15,000
1932	13,750	22,500	4,900	15,000	15,000
1933	13,750	22,500	4,900	15,000	15,000
Cruisers "B": [1]					
1930	14,600	18,200	7,151		
1931	14,600	18,200	7,151		
1932	14,600	18,200	7,151		
1933	14,600	18,200	7,151		
1934	14,600	18,200	7,151		
Destroyers: [1]					
1930	25,000	18,473	4,282		
1931	25,000	18,473	4,282		
1932	25,000	18,473	4,282		
1933	25,000	18,473	4,282		
1934	25,000	18,473	4,282		
1935	25,000	18,473	4,282		
Submarines: [1]					
1930	5,020	3,530	2,400		
1931	5,020	3,530	2,400		
1932	5,020	3,530	2,400		
1933	5,020	3,530	2,400		
1934	5,020	3,530	2,400		

[1] France and Italy not parties to this part of the treaty.

NOTE.—The Japanese have their allowance of submarines built and building which will still be within the age limit in December, 1936, but a special provision of the London treaty permits them to replace 12,000 tons before that date.

(4) *The following have been provided for since the treaty was signed in April, 1930*

1930–31 PROGRAM

NOTE.—French program for 1930 was approved in March before treaty was signed in April.

	United States		Great Britain		France		Italy	
	Number	Tons	Number	Tons	Number	Tons	Number	Tons
Cruisers "A"					1	10,000	1	10,000
Cruisers "B"			3	19,500	[1] 1		2	10,500
Destroyers			9	12,375	6	15,000	4	4,960
Submarines			3	[2] 3,000	11	11,226	22	17,740
					[3] 2			
					[4] 1			

1931–32 PROGRAM

	United States		Great Britain		France		Italy	
	Number	Tons	Number	Tons	Number	Tons	Number	Tons
Battleships					1	[5] 23,000	([6])	
Cruisers "B"			3	18,000	2	[5] 13,600	([6])	
Destroyers	[7] 11		9	[2] 12,375		([5])	([6])	
Submarines			3	[2] 3,000	2	([5])	([6])	
			[8] 1		[8] 1			
			[3] 4		[9] 1			
			[1] 1					
			[4] 1		[10] 4			

[1] Mine laying.
[2] Estimates.
[3] Sloops.
[4] Net layer.
[5] Not yet voted.
[6] Program for 1931–32 not yet published.
[7] The Navy Department asked for 1 carrier of 13,800; 1 flying deck cruiser (9,000 tons); 1 cruiser (7,000 tons); 4 submarines (4,000 tons); 12 destroyers (already authorized in 1916). The House committee eliminated the cruiser. Congress provided for 11 destroyers.
[8] Gunboat.
[9] Transport.
[10] Escort ships.

THE GERMAN NAVY

The following is taken from an article recently printed in the German Marineleitung explaining the German Navy's replacement plan:

According to the clauses of the Versailles treaty and the provisions of the Interallied Naval Commission, the following ships are allowed the German Navy:

Class	Number	Age limit
Battleships	8 (6 in service, 2 in reserve)	20 years.
Cruisers	do	Do.
Destroyers	16 (12 in service, 4 in reserve)	15 years.
Torpedo boats	do	Do.
Patrol boats	18	Unlimited.
Ordnance-school ships	4	Do.
Tenders, fishery patrol	8	Do.
Mine sweepers	38	Do.
Surveying ships	2	Do.
Deep-sea sounding ships	4	Do.
Training ship	1	Do.
Blockade ships	Unlimited	Do.

Four cruisers and twelve destroyers have been replaced and a fifth cruiser is nearing completion. The following table shows the program for the replacement of battleships:

Battleship	Launched	Replacement		Age of vessel at time of replacement
		Begun	Ended	
Preussen	1903	1928	1932	29 years.
Lothringen	1904	1931	1934	30 years.
Braunschweig	1902	1932	1936	34 years.
Elsass	1903	1934	1938	35 years.
Hessen	1903	These come under Pt. II of replacement plan		About 40 years.
Hannover	1905			
Schlesien	1906			
Schleswig-Holstein	1906			

It will be noted that replacements for only the first four battleships have been authorized, and money has been appropriated for only two of these.

It has been difficult to provide for the above vessels, which are naturally considered the most important. It has been even more difficult to provide replacements for the less important types, with the result no torpedo boats, only 7 patrol boats, 1 school ship, 2 fishery protection vessels, no mine sweepers, no surveying ships, and no blockade vessels have been replaced.

Under the present building program the German Fleet will, by the summer of 1938, consist of 4 capital ships, 5 cruisers, and 12 destroyers. All other ships of the navy will be too old or too small to be considered effective.

Comparison of new German ships with similar United States and British ships

Characteristic	Leipzig	Omaha cruiser	Ersatz-Preussen	Treaty cruiser	Renown battle cruiser
Displacement (standard)	6,000	7,050	10,000	10,000	32,000.
Length	603.5	555.5 (O. A.)	608.2	588 (O. A.)	794 (O. A.).
Beam	50.8	55	66	61.75	102⅔.
Horsepower (full)	65,000	94,920	57,500 (plus) [1]	107,000	113,000.
Horsepower (cruising)	12,000 (Diesel)		20, 500 (plus) [1]		
Speed (full)	32 (plus)	34.4	28 (plus) [1]	32.7	31.5.
Speed (cruising)	18–19 (Diesel)	15	20–21 (2 engines, three-fourths power).	15	15 (estimated).
Cruising radius (cruising)	18,000 miles (at 18 kilometers).	9,200 miles (at 15 kilometers).	15,000 miles (at 20 kilometers).	11,000 miles (at 15 kilometers).	24 days at economical speed, 8,600.
Radius at full power			7,000 (at 28 plus)		2,300 (about).
Armament:					
Main	9–5.92 inch, 50-caliber	12–6 inch, 53-caliber	6–11 inch, 50-caliber	9–8 inch, 55-caliber	6–15 inch, 42-caliber.
Second	4–3.50 inch, antiaircraft	4–3 inch, 50-caliber, antiaircraft.	8–5.92 inch, 50-caliber	8–5 inch, 25-caliber, antiaircraft.	12–6 inch, 45-caliber.
Effective range	Standard		38,500 yards [1]		30,300 (30° elevated).
Weight of shell	do		700 pounds	260 pounds	1,920.
Firing time	do		30–50 per cent decrease expected.		
Danger space			Flat trajectory		
Armor:					
Side	2.5-inch	3-inch	6-inch almost to bow and stern.	5¾-inch	9 to 6 inch amidships, 6 to 4 inch within bow.
Deck	1-inch	60 pounds	4-inch to magazines, 2-inch rest.	90 pounds	3 to ¾ inch.
Fore and aft bulkheads	1-inch inclined internal side		2.8-inch inclined internal side.	4/3 inches forward, 4.7/3 inches aft.	4 inches forward and 3 inches aft.
Protect—					
Thwartship bulkheads.			4 3.9-inch bulkheads, separate magazine and machinery.	2, 3, and 4 inch	
Conning tower		50 pounds	6-inch	5-inch	10-inch.
Turrets	Front		Front, 8-inch	8-inch	
Do	Side		Side, 2-inch	1½–3¾ inch	11 to 7 inch.
Do	Top		Top, 6-inch	2¾-inch	
Barbettes			6-inch	5-inch	7 to 4 inch.
Miscellaneous			Additional full 1-inch protecting deck.		

[1] 15,000 at 15 knots in previous ships.

Information regarding German cruisers believed to be reliable.

THE FRANCO-ITALIAN NAVAL NEGOTIATIONS

Exactly one year ago the Conference on Naval Disarmament was brought to a conclusion with the signature, on April 22, 1930, of the London naval treaty. This treaty, it will be remembered, was of limited scope and application, principally owing to the failure of the French and Italian Governments to reconcile their minimum demands as regards aggregate tonnage, and, in so far as it resulted in any material restrictions or reductions in naval construction, its provisions were confined to the three principal naval powers—Great Britain, the United States of America, and Japan. That part of the treaty which was signed by France and Italy did little to limit the claims put forward by those two countries and, in respect of cruisers and auxiliary craft generally, did not involve any definite modification of their existing building programs. For this reason, and because it is important that France and Italy should not come to the Disarmament Conference next February with fundamentally differing views as to their rights in respect of naval armaments, efforts have been made more or less continuously since last autumn to remove the main difficulties in the way of agreement. The object has been to find the means to enable the two countries to join in the undertaking given by the three principal naval powers in Part III of the London treaty, by which the position as regards naval armaments was stabilized until the end of 1936, the date when the treaty expires. Discussions were actively carried on throughout the winter, and in these British Government experts took part, and every effort was made to hasten on the work of reconciling the claims of Paris and Rome, since, as Mr. Henderson said when speaking at Lowestoft on March 7, there was urgent need for haste owing to the fact that within a few days France and Italy were expected to announce their building programs for 1931–32.

At the end of February, after visits had been made to both continental capitals by the Fritish Foreign Secretary and the First Lord of the Admiralty, agreement was understood to have been reached on a basis which was believed to stabilize until 1936 the existing relation between the two fleets, and so eliminate all danger of competition for the next five years. The terms of the settlement were published on March 1, in the form of a White Paper,[1] but when this appeared it was seen that the "bases of agreement" reproduced did not include detailed figures of the aggregate tonnages and numbers of vessels accepted by the two governments in respect of cruisers and destroyers, and it would appear that, in actual fact, no definite figures were finally agreed upon as regards

[1] Comd. 3812.

the replacement of these vessels. The agreement as published has been described as vague and obscure by the press, both in England and abroad, and this has been variously attributed to the desire to gloss over the delicate question of ratios between France and Italy and to the need not to make apparent the concessions made by each country. The document should, however, be read as an annex to the London naval treaty, and is, in fact, not to be understood without reference to the terms of that treaty and of the treaty of Washington; it is thought, therefore, that any filling in of the details of the present agreement—if it can be so called—should be prefaced by a reference to those sections of the two treaties which form the basis of the points now settled.

The following provisions of the Washington treaty have a direct bearing on the present negotiations:

(1) The total capital ship replacement tonnage was fixed at 175,000 tons each for France and Italy.

(2) The total aircraft-carrier tonnage was fixed at 60,000 tons for each country.

(3) France was allowed to retain 10 capital vessels, aggregating 221,170 tons, and to lay down one new vessel, of a maximum tonnage of 35,000, in each of the years 1927, 1929, and 1931.

(EDITOR'S NOTE.—*These 10 ships included 3 predreadnoughts of the Diderot class which France could retain indefinitely, no provision being made for their scrapping. Only 7 replaceable capital ships were retained by France. France expressly reserved the right to employ the capital-ship tonnage as she considered advisable, subject solely to the limits of 35,000 tons and 175,000 tons for displacement and tonnage, respectively.*)

(4) Italy was allowed to retain 10 capital vessels, aggregating 182,800 tons, and to lay down 1 new vessel, of a maximum displacement of 35,000 tons, in each of the years 1927, 1929, and 1931.

(EDITOR'S NOTE.—*These 10 ships included 4 predreadnoughts of the Roma class for which no provision for scrapping was made. Italy made the same reservation as France in regard to employment of capital-ship tonnage.*)

In the treaty of London the provisions which directly affect the points dealt with in the recent negotiations are the following:

(1) Both France and Italy were limited to the construction of only two of the new capital ships accorded them at Washington, i. e., they were allotted 70,000 tons each, representing the vessels to be laid down in 1927 and 1929 (not 1931).[2]

(2) All the powers signatory to the treaty had the right to replace, within the limits of the tonnages awarded them, ships becoming overage during the interval between the date of the conclusion of the treaty and its expiry (December 31, 1936).[3]

(3) The three principal powers limited their new construction of cruisers and submarines strictly to replacements.

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[2] *Vide* art. 1.

[3] *Vide* art. 9 and Annex I to Pt. II of the treaty.

As has already been pointed out, the original object of the conversations between the two Governments, or rather the three Governments—for Great Britain has been specially interested in this—was to secure the adherence of France and Italy to Part III of the London treaty. It should, therefore, be made clear the exact nature and extent of the obligations assumed by those two countries by their accession to that part, and these may now be enumerated. They accept—

(1) The definition of cruisers as all-surface vessels the displacement of which exceeds 1,850 tons or which carry a gun of over 5.1 inches caliber.

(2) The division of cruisers into two subcategories: (A) with guns above 6.1 inches and (B) with guns not above 6.1 inches caliber.

(3) The definition of destroyers as surface vessels not exceeding 1,850 tons displacement and with guns not over 5.1 inches.

(4) The stipulation that in the case of destroyers not over 16 per cent should be of over 1,500 tons displacement.

(5) The stipulation that transfers between cruisers of category (B) and destroyers are not allowed over 10 per cent of the allotted total tonnage of the category or subcategory into which the transfer is made.

(6) The escalator clause (article 21 of the treaty), permitting the signatories to increase their tonnages in the event of their national security being materially affected by the new construction of any power other than those who joined in Part III.

(EDITOR'S NOTE.—*Also, that not more than 25 per cent of cruiser tonnage may be fitted with landing-on platform.*)

In the provisions as to cruiser construction accepted by Great Britain, the United States of America, and Japan in Part III it is laid down by article 19 that—

The tonnage laid down in any category subject to limitation * * * shall not exceed the amount necessary to reach the maximum allowed tonnage of the category or to replace vessels that become overage before December 31, 1936. Nevertheless, replacement tonnage may be laid down for cruisers and submarines that become overage in 1937, 1938, and 1939, and for destroyers that become overage in 1937 and 1938.

Before dealing with the details of the March agreement something must be said as to the French program of naval construction. The figures to which that country is working were drawn up in 1922, when the program would be completed. The total tonnage arrived at was 744,000 tons, and this figure was slightly raised at the end of 1929 when the French Government reviewed the position in detail, in view of the forthcoming meeting of the London Naval Conference. Speaking on December 19, 1929, M. Dumesnil, the *rapporteur* of the naval budget, said that their existing strength in new ships, which he described as alone of military value, was approximately 422,689 metric tons,[5] but that if they proceeded with their program as they then

[5] A metric ton is 2,204 pounds, as compared with an English ton of 2,240 pounds; 100,000 tons=101,600 metric tons.

intended their aggregate tonnage at the end of 1936 would be 625,000 metric tons. About the same time the Government laid it down that the "absolute need" of the country was a minimum of 760,407 metric tons, and in the *exposé* of the French position, published on February 18, 1930, during the London conference, a minimum of 684,886 tons was claimed as essential for the country.

At the time of that conference the superiority of the French Navy over that of Italy was calculated at 240,000 metric tons, but this included 83,000 tons of old vessels, so that the superiority in new vessels was 157,000 tons, which is approximately the figure accepted in the March agreement (157,441 tons).

To come now to the agreement itself, the only figures available with which to fill in the details of its provisions are those given in the French press on March 12 last. These figures are official, however, and, taken in conjunction with the terms published on March 1, give a fairly complete outline of the position. The main terms of the agreement may be enumerated as follows:

(1) France and Italy are both allowed, before December 31, 1936, to complete two capital ships, the displacement of which will not exceed 23,333 tons and the gun caliber of which will not exceed 12 inches.

(2) On the completion of each ship France will scrap one ship of the *Diderot*[6] class and Italy will scrap approximately 16,820 tons of first-class overage cruisers, i. e., 33,640 tons in all.

(3) Without prejudice to a general revision of the capital-ship tonnages established by the treaty of Washington, the total tonnage in this category accorded to France and Italy shall be raised from 175,000 to 181,000 tons.

(4) Before December 31, 1936, France and Italy may complete, respectively, 34,000 tons of aircraft carriers.

(5) As regards vessels whose tonnage is regulated by the London naval treaty, i. e., cruisers, destroyers, and submarines, France and Italy will conform to the following rules in preparing their programs for construction to be completed before December 31, 1936.

(A) Cruisers with guns of more than 6.1 inches. No further construction after completion of the 1930 program.

(B) Cruisers with guns of 6.1 inches or less, and destroyers. The tonnage of new construction to be completed shall not exceed the tonnage which is replaceable in this category before December 31, 1936. Vessels already overage and vessels becoming overage during the period of the treaty shall be scrapped on being replaced.

A declaration was added here on behalf of the British as well as the French and Italian Governments to the effect that the age of destroyers (in respect of

[6] The *Diderot*, of 18,890 tons displacement, was placed in commission in September, 1911, and is now used as a training ship.

those due to be replaced before December 31, 1936) should be extended to 16 years.

(C) Submarines: No further construction other than for completion of the 1930 program and for the replacement of tonnage becoming overage after December 31, 1931. Overage vessels shall be scrapped, except where this would result in the total submarine tonnage falling below the figure mentioned in Article 16[7] of the London treaty.

Subject to a general revision of the question in the Disarmament Conference of 1932, the tonnage of French submarines in commission will not exceed, up to December 31, 1936, the figure of 81,989 tons, representing at the present moment the underage tonnage of vessels built or building.

To this provision a declaration was attached that the—

"Members of the British Commonwealth of Nations maintain that this figure of 81,989 tons is too high in relation to their destroyer figure of 150,000 tons under the London naval treaty, but they agree to notify the other signatories of Part III of the London treaty that they will not have recourse to article 21 of the treaty pending the general revision of the naval question mentioned above."

(6) General provisions. France and Italy declare—

(i) That they will accept all the provisions of Part III of the London naval treaty in so far as it applies to the members of the British Commonwealth of Nations, the United States of America, and Japan;

(ii) That they will accept, in so far as they are concerned, those provisions which are of general application and which do not conflict with the provisions of the present arrangement.

At the time of the signature of this arrangement a declaration in the following sense would be signed, either by the members of the British Commonwealth of Nations, France, and Italy, or else by all the parties to the London treaty:

It is understood that the present arrangement establishes no permanent ratio in any category of ship as between the members of the British Commonwealth of Nations, France, and Italy. In particular, no precedent is being created for the final solution of the question whether, and if so, in what manner, tonnage remaining overage on December 31, 1936, may ultimately be replaced.

The above provisions, forming the "bases of agreement," were prefaced by a memorandum, dated March 11, 1931, and signed by Mr. Henderson and Mr. Alexander. In this it was explained that the slight increase proposed in the total tonnage of capital ships accorded to France and Italy under the treaty of Washington would not in itself give rise to any new construction during the period of the agreement.

On the subject of 6-inch-gun cruisers the memorandum states that—

It is anticipated that the French Government will in 1936 possess a large overage tonnage in this category. It was made clear during the negotiations that the temporary retention of this tonnage conferred on France no claim to its ultimate replacement. * * *

[7] This is in Pt. III, and accorded to the 3 signatory powers 52,700 tons each.

As to submarines, it was stated that both the French and Italian Governments had agreed not to include any of these vessels in the 1931 program and not to lay down any further submarine tonnage before 1933.

As will be seen from the above, the lack of figures existing and prospective tonnage totals makes the "bases of agreement" somewhat obscure, but the official figures of aggregate tonnages published in the French press enable many of the details to be filled in.

The following are the tonnages of the two fleets at the present date, including vessels under construction and authorized:

	France	Italy
	Tons	*Tons*
Capital ships	133, 134	86, 527
Overage capital ships	52, 791	
Aircraft carriers	22, 146	
First-class cruisers	124, 424	103, 640
Light cruisers, destroyers, etc	[1] 198, 233	151, 363
Submarines	97, 875	53, 472
	[2] 628, 603	[3] 395, 002

[1] Of this total, 52,133 tons are overage.
[2] Of which 146,383 tons are overage.
[3] Of which 85,077 tons are overage.

The following are the figures of new construction which may be placed in commission before December 31, 1936 (to replace overage vessels):

	France	Italy
	Tons	*Tons*
Capital ships	46, 666	46, 666
Aircraft carriers	34, 000	34, 000
Light cruisers, destroyers, etc	51, 331	46, 158
Submarines	4, 441	2, 791
	136, 438	129, 615

Finally, the two fleets will at the end of 1936 be made up as follows:

	France	Italy
	Tons	*Tons*
Capital ships [1]	179, 800	133, 193
Overage capital ships	17, 597	
Aircraft carriers	56, 146	34, 000
First-class cruisers	70, 000	70, 000
Overage first-class cruisers	24, 851	
Light cruisers, destroyers, etc	197, 431	143, 342
Light cruisers, destroyers, etc., whose life has been prolonged	802	8, 021
Light cruisers, destroyers, etc., overage	42, 107	
Submarines	81, 989	47, 390
Overage submarines		5, 310
Total	670, 723	441, 256

[1] All capital ships will be over the 20-year age limit.—EDITOR'S NOTE.

From these figures it will be seen that in 1936 the French superiority will be, in new vessels, 157,441 tons and in overage vessels, 72,026 tons.

When issuing these figures the French Ministry of Marine accompanied them by a *communique* stating that the agreement of March 1 had the effect of hindering all race in armaments between the powers concerned and stabilized considerably (*sensiblement*), for the period up to the end of 1936, the existing proportions of the present fleets, taking into account the rights acquired and not yet exercised by France and Italy. Speaking in the chamber in defense of the agreement on March 11, both M. Briand and M. Dumont maintained that it gave France substantially all that she had ever asked for in the matter of tonnage. Two days later the Temps, in a statement which was understood to express the official view, said that the figures in the agreement established in indisputable fashion that the interests of the country had been well defended and that the door was closed to any unpleasant surprises for both parties. France had, in fact, gained in the acceptance of a tonnage increase from the existing aggregate of 628,603 tons to 670,723 tons and had established her right to lay down and complete before the end of 1936 two capital ships, of about 23,000 tons, to form that country's reply to the new German "pocket battleships." Italy, on her side, obtained from France an undertaking not to make use of her ability still further to increase her superiority, and an undertaking to restrict her submarine tonnage to a figure approximately 15,000 tons lower than she had hitherto claimed. Signor Mussolini expressed himself as satisfied with the result of the negotiations, which he regarded in the light of an extension of the London naval treaty, saying that there could be "no doubt that the 5-power naval treaty will afford the best possible preparation for the general Disarmament Conference."

As the month went on the news as to the progress made by the drafting committee engaged in putting the "bases of agreement" into final form suggested that the questions of interpretation remaining to be settled were causing more difficulty than had been anticipated. Though Mr. Henderson was able to say, as late as March 27,[8] that the difficulties were "simple questions of interpretation," the Foreign Affairs Committee of the Chamber in Paris had decided, on March 18,[9] that it must await the opinion of the Naval Committee of the Chamber, especially as to the provisions relating to new construction and replacement. It also decided that henceforth it would approve naval agreements only in so far as they were connected with the guaranties of international security already ob-

[8] In a statement to the British press representatives in Paris.

[9] It was on this day that the French Government is believed to have received its first intimation of the conclusion of the Austro-German customs union agreement.

tained or likely to be obtained. Only two days later the French Minister of Marine, in an exposé of the agreement before the two committees of the Chamber, said that—

Apart from the two cruisers[10] of 23,333 tons, the construction of which is accorded to use for the years 1931, 1932, and 1933, nothing prevents us from constructing whatever we consider necessary in 1934, 1935, and 1936, subject to new agreements and decisions of the conference of 1932.

Furthermore, in the Senate, on March 25, it was argued that the alleged superiority in French tonnage had only been obtained by the inclusion of old vessels, to which M. Dumont replied that the agreement represented merely a holiday in the augmentation of the fleet, with the object of carrying out immediately an urgent program, and he concluded:

Quant aux sous-marins, notre limitation depasse de 30,000 tonnes la part de toute autre nation. Cette superiorite est tres sensible. Nous avons obtenu d'autres superiorites, dont ce n'est pas l'heure de parler.

While no particular notice appears to have been taken of these statements abroad, by the end of March it was evident that the final drafting of the agreement was being delayed by difficulties which had not originally been foreseen. Reports were current that the French Government were claiming the right to start construction in 1935 and 1936 of ships due to be replaced in 1937 and 1938, and that they had the intention of laying down 66,000 tons of new construction which would come into commission in 1937, thus seriously affecting the balance of strength in new vessels almost immediately after the expiry of the period of the London treaty. What the French Government is actually claiming is the right to lay down in 1935 and 1936 whatever cruiser and destroyer tonnage it considers that the needs of the country's security dictate, and to replace certain already overage vessels whose retention has only been permitted as a special case, instead of limiting construction strictly to the figures necessary to replace the tonnage becoming overage in 1937, 1938, and 1939. This means that France is now apparently unwilling to subscribe to article 19 of the London naval treaty, the text of which has been quoted above, in spite of the fact that, under the general provisions of the "bases of agreement," she declares that she will accept all the provisions of Part III, in which article 19 appears. Were her claim to be admitted it would mean that, whereas the British Government is bound until the end of 1936, in that her construction program for 1935 and 1936 is limited to the laying down of keels necessary to replace vessels becoming overage during the following three years, France would only be bound for four years, or, in other words, would

[10] These cruisers are capital ships by definition.

be accepting the terms of the London treaty for four years instead of six.

The Italian Government has maintained considerable reserve as to its opinion of the attitude taken by France, but, in view of the appearance of statements in the Paris press which seemed misleading and erroneous, a semiofficial account of the Italian standpoint was published in the Giornale d'Italia on April 7. In this it was pointed out that, as regards light cruisers and destroyers, Italy acknowledged the right of France to start building during 1934, 1935, and 1936 the tonnage necessary to replace the vessels which reach the age limit in 1937, 1938, and 1939. But she could not accept the French claim to lay down in those same years ships not contemplated in the agreement and, in particular, to start building before the end of 1936 ships to replace existing overage units "which Italy has never considered as constituting a right to an increase of the level of tonnage in new ships." In other words, Italy admits the French right to replace vessels automatically becoming overage in 1937–1939, since this is in accordance with the final paragraph of article 19 of the London treaty, but she maintains that the replacement of already overage vessels which France has been allowed to retain (instead of to scrap) was not contemplated or intended during the negotiations, and that their eventual scrapping should not be made to provide a justification for new construction, and, accordingly, for an increase in the French superiority in new ships. This is the British view also, and until the French claim is abandoned it is difficult to see how the drafting of a definite agreement can be effected.—H. L. (from fortnightly Bulletin of Royal Institute of International Affairs).

FOREIGN POLITICAL NOTES

THE NETHERLANDS

NATIONAL POSITION OF NETHERLANDS—QUESTION OF NEUTRALITY

In the upper chamber of Parliament Professor van Embden, the leader of the Independent Democrats and a keen advocate of disarmament, has addressed a series of observations to the Minister of Foreign Affairs by which he attempts to prove that to maintain neutrality in a future war is an almost impossibility for States which are members of the League of Nations, in view of the obligations under the pact. With this as a premise he concluded that the existence of an army would compel active participation in such a struggle.

The Minister for Foreign Affairs has replied officially to the theses propounded by the professor. This reply has been summed up by one of the Foreign Offices as follows:

> If the Council of the League of Nations is not unanimous in declaring a State the aggressor, room for neutrality certainly exists; if the council is unanimous, there is room for argument that a State not represented on the council and in disagreement with the council's verdict may remain neutral. The Netherlands could certainly find grounds upon which to remain neutral in case of another European conflagration.

ABSTRACT OF THESIS	ABSTRACT OF ANSWER
By reason of national position of Netherlands, our Government policy should be based on the expectation:	By reason of the national position of the Netherlands our Government policy should be based on the following points:
(*a*) That in the event of a war being waged in the neighborhood of our territory, either in this country or in our overseas possessions, we shall have to allow and facilitate the passage over our territory of the party authorized by law;	(*a*) That in the event of a war being waged in the vicinity of our territory in Europe or in our territory overseas, the passage of one of the parties over Dutch territory should be allowed exclusively in the cases prescribed by the League of Nations, and that in other cases Holland will be free to define its own line of conduct;

(*b*) That, also from a legal point of view, we shall have to participate in the economic blockade against the aggressive State;

(*c*) That for this reason the interests which formerly withheld a belligerent from violating our neutrality, viz, the advantage of maintaining both territorial cover and commercial intercourse, have been eliminated;

(*d*) That in the case sub (*a*) the disposal over an armed force will practically compel us to take an active part in the conflict.

(*b*) That the obligatory participation in the economic blockade of the aggressive State will also be limited to the cases provided by the League of Nations;

(*c*) That despite the League of Nations, cases of neutrality may not only be juridically constructed but remain practically possible, in which the interests, thus far calculated to deter beligerents from violating our neutrality, have by no means been removed;

(*d*) That the presence of defensive forces may exercise a deterring influence in preventing violation of neutrality, also from the side of forces which unjustly pretend to be League of Nations forces, and that the presence of such defensive forces, instead of forcing us to practical participation in the struggle, may contribute toward confining the conflict within bounds and preventing the struggle being transferred to our territory;

(*e*) That by maintaining such forces, Holland contributes its share to the common enforcement of law, without which the realization of the League of Nations idea would be impossible.

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